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N.P.T.A. Meeting at Chicago Well Attended

Annual Three-Day Fall Meeting of the National Paper Trade Association At Stevens Hotel, Chicago, Sept. 23-25, Brings Paper Merchants Together For the Discussion of Many Important Topics.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., September 30, 1940—Figured to be a meeting wherein all branches of the industry would sit down in an attempt to really solve their mutual problems, the annual Fall meeting of the National Paper Trade Association held at the Stevens Hotel in Chicago this week certainly accomplished that intention.

With attendance very good and swelled by visitors who thoroughly enjoyed and patronized the many fine exhibits, it didn't take the paper executives present very long to get down to the gist of the meeting —mounting costs of production as compared to the present price status governing virtually every line in the industry.

Three-Day Session Important Trade Event

In fact, the open meeting of the entire industry—recently developed as the major session of the three-day event lasting from September 23 through September 25, found manufacturers reciting for their outlets some basic truths about the cost of raw materials, labor costs and other production costs. All the time there likewise remained the specter of further taxes as Uncle Sam makes only the initial effort to finance a huge program of national defense.

Jobbers, in turn, were quick to appreciate the position of those who produce the merchandise but reported that demand had not sufficiently increased to swell the market to the place where an upward trend would maintain any degree of permanence.

The entire three day session was most productive in that it brought all branches of the industry together in a congenial atmosphere to thoroughly air their problems and the entire organization, from A. H. Chamberlain on down, is entitled to a great deal of credit for arranging so many timely discussions.

Informal Discussions at "Monday Sessions"

The "Industry Meeting" at 2 p.m. on the afternoon of September 23 brought about the first informal discussion of the condition of the industry although both the wrapping paper and fine paper divisions held morning meetings and discussed their own problems to coordinate the approach to the afternoon session. C. E. Roach presided at the Wrapping Paper Division meeting which included reports from chairmen of the following important committees: wrapping papers, E. P. Magel; bags, E. Wesselmann; tissue lines, J. E. Roach; gummed tape, C. H. Schorske; specialties, J. S. Addison and twine, C. A. Wilder. J. E. Brewer presided over the Fine Paper Division sessions where the mid-year survey was presented

J. K. Javits, counsel for the N.P.T.A. summarized the afternoon open discussion by showing the importance of integration of the paper industry. The well known attorney stressed the need for self-regulation brought about through thorough coordination of all factors and gave the warning that unless the paper industry did get its collective heads together and solve its problems it would have to expect a real tussle from those seeking to regiment all industry during this critical period.

Later in the afternoon of the first day A. W. Leslie's Fair Labor Standards Committee met and fully reported on the action of the industry in operating under federal legislation. The Wrapping Paper Merchandising Committee under W. K. Bunting met at about the same time and both meetings were followed by the Fall meeting of the Western Paper Merchants Association which injected a bit of good fellowship into an all day session fraught with very serious discussion.

Tuesday Schedule Ends with Governors Meeting

On Tuesday morning the Association listened to others discuss some of the problems confronting them. At 10 a.m. Dave Colcord of the Oberlin Company talked on "Fishing in a Bathtub" and specifically outlined the need for sound and well developed merchandising policies and procedure and a thorough understanding of market potentialities. The Certification Board report was given at this Wrapping Paper Division meeting presided over by Corwine Roach.

The Annual Paper and Twine Luncheon, always a notable feature at these paper industry meetings, attracted a most social gathering who listened to a

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Judicial Sale of Abitibi Is Still Favored

About 85 Per Cent of Bonds Now Deposited With Committee and Non-Depositing Bondholders Would Receive Their Proportionate Share of Sale Price If the Bondholders' Plan Is Completed.

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., September 30, 1940—Representations of the amount of the reserve bid that should be set when the assets and undertaking of Abitibi Power and Paper Company are put up for sale October 16, were heard before F. H. Barlow, K. C., Master of the Ontario Supreme Court, on September 20, and, it is understood, a reserve bid agreed upon, but the bid set will not be made public.

The bondholders' protective committee is still engaged in tabulating and analyzing bond deposits, and the deposits are still coming in and being accepted provisionally, subject to review by the committee itself. Up to date, it is understood, the committee has received between 85 and 90 per cent of all outstanding bonds pledged in support of its sale plan. Spokesmen for the committee say that a few bonds may still be received but considerable gratification is expressed at the high proportion of bonds deposited.

About 85 Per Cent of Bonds Deposited

If the above indication is true that the committee has 85 per cent of the outstanding bonds actually on deposit, there should be remaining unpledged only $7.2 millions out of the $48.3 millions. If 90 per cent of the outstanding bonds have been deposited, then there should be only $4.8 millions not yet pledged to support the sale plan.

However, the non-depositing bondholders would receive their proportionate share of the sale price if the bondholders' plan to purchase the Abitibi assets is successful. The large proportion of bonds actually deposited reduces the cash requirements to pay off non-depositors to comparatively small figures, depending on the eventual sale price.

Strachan Johnston, K. C., representing the trustee, had no suggestion to offer regarding the amount of the bid. N. T. Berry for the liquidator, discussed the general principles which might guide the Master in setting the reserve bid. He emphasized the importance of the earning power basis for arriving at a satisfactory and equitable figure. Using a basis of 12½ times current earnings, he obtained a figure of $82.9 millions to which he added working capital and Provincial Paper Shares, arriving at an ultimate valuation of $101.9 millions.

Glyn Osler, K. C., appearing for the bondholders' protective committee, could suggest no figure for the reserve bid, but mentioned that anything less than the amount owing on the bonds probably need not be considered. He held that comparisons with the valuations given to Abitibi properties in the original prospectus must be considered in the light of subsequent events.

Dependence on earnings over a short period, he maintained, was unsafe and Coverdale Colpitts in making their estimates had assumed certain sustaining factors.

August Earnings Up and Shipments Down

Abitibi reported earnings for August this year of $802,325, up 272.5 per cent from August, 1939, but $140,000 below July of this year.

Shipments of newsprint in August this year are down 16.2 per cent from July and earnings down 14.7 per cent. The change in shipments of bleached sulphite are smaller, amounting to a decline of slightly over 4 per cent. August earnings include $129,361 received as premium on U. S. exchange.

A further reduction in operations for September is forecast by G. T. Clarkson, receiver and manager. Shipments of newsprint are estimated at 36,000 tons in September, compared with 38,655 tons in August and 32,694 tons in September 1939. Bleached sulphite shipments, which amounted to 7,133 tons in August, are estimated at 6,000 tons for September, compared with 4,987 tons in September 1939. Shipments of bleached sulphite for the first eight months of 1940 have totalled 50,552 tons, approximately double that for the same period of 1939, and comparing with the total shipments for all of 1939 amounting to 45,819 tons.

Abitibi Receivership Dates from 1932

It will be remembered that Abitibi Power and Paper Company, one of the largest newsprint producers in Canada, went into receivership September 10, 1932, following failure to meet bond interest payment due June 1 of that year. G. T. Clarkson, Toronto, was appointed receiver, and R. S. McPherson, Toronto, liquidator. Following unsuccessful attempt to reorganize the company in 1937, efforts were renewed early in 1939. In March, last year, the bondholders' protective committee announced its intention of seeking a judicial sale of the properties as a method of reorganization. This sale has been authorized by the Supreme Court of Ontario to be held October 16. Action was taken at the request of the Bondholders protective committee, of which H. J. Symington, Montreal, is chairman.

Continual protests have been made by representatives of shareholder interests, led by the preferred shareholders' protective committee, of which D. H. Gibson, Toronto, is chairman. Another committee, under the chairmanship of R. G. Meech, Toronto, operates for common stockholders, while general trade creditors are represented by a committee under the leadership of Clement Tremblay, Lachute Mills, Que.

Judicial Sale Favored

The judicial sale is a feature of the plan of procedure advocated by the bondholders' protective committee and dated March 15, 1939. Under this plan the bondholders propose to purchase the assets of the company, through a new company and deliver to the bondholders "certificates of beneficial interest" for common shares in the new company. The shares of the new company issued to assenting bondholders will be put in escrow until July 1, 1942, and an option granted to the unsecured creditors and shareholders to purchase the stock during this period at fixed prices. The new company would have an authorized

capital of 1,930,680 no par value common shares and may issue additional shares or other securities that may be required to raise necessary cash.

Following transfer to the new company, it is proposed to issue common shares to an escrow agent at the rate of 40 shares for each $1,000 of assenting bonds. The agent in turn will issue to the committee for the account of assenting bondholders, certificates of beneficial interest representing such shares. These certificates will be delivered to the bondholders themselves.

Bondholders who do not deposit their bonds under the committee's scheme would receive their proportionate share of the cash price, less a share of expenses. Completion of the options to purchase shares to be given to present shareholders and creditors would result in realizing sufficient money to satisfy bondholders' claims for interest and principal in full.

Numerous individuals and organizations have appealed for more generous treatment on behalf of shareholders.

Abitibi Earnings Sharply Up This Year

Abitibi's operations have shown remarkable increases over the past year. For the first eight months of 1940 monthly earnings of $5.2 millions, the amount available for depreciation and bond interest, compares with $1.5 millions in the corresponding period of 1939 and represents an increase of 256.18 per cent. For all of 1939 the company had $3.4 millions available for depreciation and bond interest.

Working capital has improved steadily each year since the company went into bankruptcy in 1932. At the end of 1939 the net working capital amounted to $10.8 millions, and it is estimated that at the end of this year it will be $18 millions, of which $8 millions will be in cash.

Abitibi and its subsidiaries control eight newsprint mills and a bleached sulphite mill. Two of its newsprint mills are not operating but the bleached sulphite output has been increased in recent months.

Columbian Paper Co. Elects Officers

BUENA VISTA, Va., September 27, 1940—J. Frank Key was elected general manager of the Columbian Paper company at the annual stockholders' meeting. Other officers reelected were Howard Trumbower, president and treasurer; J. Frank Key, secretary, and M. D. McKee, assistant secretary and assistant treasurer.

Directors reelected in addition to the above were F. W. Ancona and John W. Healy, Pottstown, Pa.; Harry E. Whitcomb, Worcester, Mass.; George B. Garrett and J. Maurice Kelley, Philadelphia.

To Receive Paper and Pulp from Finland

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., October 2, 1940—Under the agreement recently concluded between Germany and Finland, Germany will receive, among other primary products, wood pulp and paper, according to a report from the American Embassy, Berlin. It is reported that Germany did not desire to take large quantities of wood products such as pulp, and only did so at Finland's request. In exchange for Finnish products Germany will ship quantities of coal and coke, iron and steel, and manufactured goods, including paper.

Wallpaper Production Decreases

Manufacturers of wallpaper in the United States reported small decreases in wages and production in 1939 as compared with 1937, according to preliminary figures compiled from returns of the Census of Manufactures for 1939 and released today by Director William L. Austin, Bureau of the Census, Department of Commerce.

This industry, as constituted for Census purposes, includes establishments engaged wholly or principally in designing patterns and printing paper to cover interior walls and ceilings.

The 1939 Census of Manufactures is the first Census for which employees of wallpaper plants who were primarily engaged in distribution or construction activities have been called for separately on the schedules. It is not known how many of the employees reported for 1937 were engaged in distribution and construction and how many were engaged in manufacturing. Employees of the plants who were reported as engaged in distribution and construction activities in 1939 are not included in this preliminary report but will be included in the final report.

The wage earners primarily engaged in manufacturing employed in this industry in 1939 numbered 4,054, a decrease of 10.8 per cent compared with 4,543 reported for 1937, and their wages, $5,333,246, fell below the 1937 figure, $5,455,289, by 2.2 per cent. See footnote 3 below concerning full-time and part-time workers

The value of wallpaper produced in 1939 amounted to $24,953,799, which is a decrease of 6.8 per cent from the $26,771,546 reported for 1937.

Summary statistics for 1939 and 1937 are given in the following table. All figures for 1939 are preliminary and subject to revision.

SUMMARY AND PRODUCTION STATISTICS FOR THE INDUSTRY: 1939 AND 1937

(Because they account for a negligible portion of the national output, plants with annual production valued at less than $5,000 have been excluded since 1919)

	1939	1937	Per cent of decrease (—)
Number of establishments	46	42	(*)
Salaried personnel [1]	499	628	—20.5
Salaries [1, 2]	$1,468,733	$1,658,517	—11.4
Wage earners (average for the year) [3]	4,054	4,543	—10.8
Wages [2, 3]	$5,333,246	$5,455,289	— 2.2
Cost of materials, supplies, fuel purchased electric energy, and contract work [2]	$11,695,922	$11,919,748	— 1.9
Value of products, total [2]	$24,968,843	$26,771,995	— 6.7
Wallpaper:			
Number of rolls	372,649,686	411,186,355	— 9.4
Value	$24,953,799	$26,771,546	— 6.8
Other products	$15,044	$449	...
Value added by manufacture [4]	$13,272,921	$14,852,247	—10.6

* Per cent not computed where base is less than 100.

[1] No data for employees of central administrative offices are included.

[2] Profits or losses cannot be calculated from the Census figures because no data are collected for certain expense items, such as interest, rent, depreciation, taxes, insurance, and advertising.

[3] The item for wage earners is an average of the number reported for the several months of the year and includes both full-time and part-time workers. The quotient obtained by dividing the amount of wages by the average number of wage earners should not, therefore, be accepted as representing the average wage received by full-time wage earners.

[4] Value of products less cost of materials, supplies, fuel, purchased electric energy, and contract work.

Mudge Paper Co. Gets Good Order

BALTIMORE, Md., September 30, 1940—The Mudge Paper Company of Baltimore has secured an unusually nice order from the Government Printing Office, involving 200 M sheets of cloth lined paper, the value of which is approximately $15,000.

Consolidated Co. to Add to Finishing Room

Work Starts On Addition To Finishing Room At Main Mill of Consolidated Water Power & Paper Co. — Wausau Paper Mills Ship 40-Ton Order To China—Reservoir Hearings On October 8.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., September 30, 1940—Work was begun last week by the Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis., on an addition to the finishing room of its main mill at Wisconsin Rapids. It will cover an area of 46 by 260 feet extending south of the present structure, and will be of brick, concrete and steel.

Of three-story construction, the addition will be used for finishing room operations, storage and shipping. The work is expected to be completed by January 1.

Additional Improvements

Structural and mechanical improvements are also being made in the old machine room housing machines Nos. 1 and 2. The machine room roof is being raised to facilitate installation of improved ventilation and economizers. Changes are also being made to increase production on the No. 2 machine.

Wausau Ships 40-Ton Order to China

An order for 40 tons of water-marked bond paper is being shipped this week by the Wausau Paper Mills Company, Brokaw, Wis., to the Yee Tin Tong Medical and Perfumery Manufactory of Honkong, China. The order was obtained by a west coast jobber. It will be sent via the eastern route on a 15,000-mile journey. The paper bears the watermarked outline of a Buddha and underneath the words, "Yee Tin Tong." The paper apparently is intended to be used for wrapping or lining.

Reservoir Hearings on October 8

Postponed hearings on the proposed Wolf River Reservoir Company dam on the Wolf River near Lily, Wis., will be held by the Wisconsin Public Service Commission October 8, according to notice issued last week. The company seeks to construct a large storage reservoir to augment the water supply of paper mills and power plants along the Fox River. The charter for construction was granted by the last Legislature.

Sells Interest in Atlas Tag

R. H. Kuehmsted, president, has sold his interest in the Atlas Tag Company, Neenah, Wis., to Irwin L. Young of Chicago. The company is an extensive converter in the quantity tag field. Mr. Kuehmsted says his plans for the future are indefinite.

Participation of Industry in Defense Plan

The part the pulp and paper industry will play in the national defense program is slowly taking shape, according to D. Clark Everest, president and general manager of the Marathon Paper Mills Company, Rothschild, Wis. Mr. Everest is group executive of the pulp and paper section of the National Defense Commission, and Charles W. Boyce, vice-president of the Northwest Paper Company, Cloquet, Minn., is assistant. Mr. Everest was in Washington, D. C. last week conferring with commission officials, but declined to comment further because all interviews must be passed upon by the defense commission. It is reported that mills in the Wisconsin River Valley are receiving contracts for paper on which army conscription forms will be printed.

To Play Off Golf Finals

Finals in the annual golf tournament of Kimberly-Clark Corporation employees of Neenah, Wis., are to be played before October 7. Three players have reached the finals in two of the four flights, played at Ridgeway Golf Club. In the F. J. Sensenbrenner flight, Chet Bland and Robert Stark, finalists, will play for the flight championship. A. Briggs has reached the finals in the Harry Price flight.

Wisconsin Co. Awarded Safety Plaque

The Wisconsin River Pulp and Paper Company, Stevens Point, Wis., has been awarded an engraved safety plaque by the Employers Mutual Liability company of Wausau, Wis. The award was in recognition of completion of a year's operations with only one lost-time accident. The accident frequency (number of accidents per million man-hours of work) for the company is 2.91, as compared to a frequency of 18.9 for the paper and pulp industry as a whole.

Edw. H. Meyer Co. Awarded Contract

Contract for the new building for the finishing room at Badger Paper Mills, Peshtigo, Wis., has been awarded to the Edw. H. Meyer Construction Company, of Oshkosh, Wis., and not to C. R. Meyer & Sons, as reported in the September 19 issue.

Insurance Fund Reaches $222,323,497

With the deposit of $14,889,659.81 in contributions during the month of August, 1940, the New York State Unemployment Insurance Fund increased slightly for the second successive month, according to a report issued by Industrial Commissioner Frieda S. Miller. Although some of these deposits apply to prior payroll periods, the great bulk of the sum represented contributions due on payrolls for the second quarter of 1940.

Summarizing the status of the funds which are used primarily for the payment of benefits to unemployed workers, Commissioner Miller noted that August's transactions brought the total amount of contributions deposited since January 1, 1936, when they first became payable, to $433,337,766.18, and the total interest credited to the Fund to $10,465,588.87. Benefit payments to unemployed workers since January 1, 1938, when benefits first become payable, reached the total of $241,479,857.79. This left $202,323,497.26 available at the end of August for payment of unemployment insurance benefits and for refunds to employers.

Canadian Paper and Pulp Output Rising

Paper and Pulp Industry of Canada Lead Other Industries In Procuring Vital American Credits—Fine Paper Mills Doing Well—Insulating Board and Kraft Paper Production Show Large Gains.

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., September 30, 1940—The pulp and paper industry of Canada looms large in procuring vital American credit in this second year of the European conflict. Gold exports and the tourist trade are two other great sources of help in this connection, but the pulp and paper industries lead all the rest. One dollar out of every six dollars of Canada's gross export trade represents pulp and paper products. This is the record of an industry that at the beginning of the century was not sufficiently important to be included in the Dominion trade returns.

Fine Paper Outlook Favorable

Manufacturers of fine papers in Canada have experienced an increased demand for their products over the last twelve months. The immediate outlook continues favorable and the financial returns for the current year should be above average. The imposition of new taxes, especially an excess profits tax, however, promises to draw rather heavily on a large part of the gain in gross revenue. Indications are that the net position of individual operators will show an improved profit and loss statement.

One of the chief problems of the makers of fine papers in Canada is to produce all the kinds of paper required for the relatively limited quantities dictated by a comparatively small, but widely scattered population.

Output of Insulating Board Rising

An outstanding development of the Canadian pulp and paper industry in recent years has been the very substantial increase in output of insulating board. At one time considered a mere by-product of the larger plants, insulating board now ranks high on its own account. The introduction of new methods of use and refinements in manufacture have created a demand in the building trades. Use of board for insulating, interior decoration and acoustical purpose has grown very rapidly. It has been greatly stimulated by the Federal housing project carried out before the beginning of war. Millions of dollars were spent in home improvements and there was a sharp upswing in the demand for insulating board. The war has brought an additional demand. The erection of both temporary and permanent shelters for troops has called for millions of feet, both in Canada and Great Britain.

Demand For Kraft Paper Sharply Up

Kraft paper manufacturing has undergone a marked betterment over last year. European conditions naturally have been the chief factor in this change. There has been a sharp increase in the demand for kraft paper, kraft liner and other products manufactured from sulphate pulp. Practically all the plants in Canada have been operating at capacity or very near capacity during the year. There has been less competition from American sources, better prices, and indications are that the present favorable conditions will prevail for some time. There has also been a considerable increase in export business for Canadian kraft makers.

U. S. Ships More Wood Pulp

WASHINGTON, D. C., October 2, 1940—United States exports of all classes of wood pulp in August, aggregating 60,379 tons and valued at $3,998,973, were the second highest monthly total on record, the Commerce Department announced. Shipments were exceeded only by those of July of this year which totalled 64,700 tons.

Wood pulp shipments for the first eight months of 1940 averaged 42,200 tons per month against 11,600 tons per month in the same period a year ago and 26,900 tons per month in the previous high year of 1937.

Unbleached sulphate wood pulp totalling 21,804 tons was the largest single type of export during August. In addition there were shipped 13,673 tons of bleached sulphite, except rayon and special grades; 12,222 tons of rayon and special grades of bleached sulphite; 10,341 tons of unbleached sulphite; 1,895 tons of bleached sulphate; and 354 tons of soda pulp.

The United Kingdom was the largest single market for United States wood pulp in August, taking 31,098 tons. Although this figure was slightly below the amount shipped to the United Kingdom in July, it represents an increase of nearly 900 per cent over shipments to the United Kingdom in August, 1939.

Japan was the second largest purchaser of United States wood pulp in August, taking 10,005 tons or nearly 600 per cent more than was purchased by that country in August, 1939.

Other major purchasers during the month were Brazil, 3,852 tons; Australia, 3,337 tons; Mexico, 2,294 tons; Argentina, 2,061 tons; and Canada, 1,261 tons.

Blue Print Reading

Much of the difficulty and all of the mystery of blue print reading is dispelled from the layman's mind in the pages of "Simple blue print reading" with special reference to welding and welding symbols. The book is published and may be obtained from The Lincoln Electric Company, Cleveland, Ohio, at 50 cents a copy.

In common with other manuals relating to welding publishing by The Lincoln Electric Company, this book clearly explains the fundamental principles and practices of good workmanship. As the field of fabrication is a large and expanding one, welding is one of its newest and most effective tools. This text is a practical presentment of the subject in a concise and easily understood manner and should prove of value to learners of the trade and welders of experience will also doubtless find much useful information on welding in its pages.

Government Paper Bids and Awards

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., October 2, 1940—Government Printing Office has announced the following paper awards.

Paper Corporation of U. S. will furnish 9,750 pounds (300,000 sheets) of 21 x 32 green sulphite manifold paper at 8.78 cents, bids for which were received on September 2.

Barton, Duer & Koch Paper Company will furnish 12,600 sheets of 16 x 21 86, artificial parchment paper at $36.48 per M sheets. Same firm will also furnish 2,000 sheets of white monmouth Drexel vellum paper at $9.75 per M. sheets.

Printing Office has received the following bids for 200,000 sheets of 24 x 36 white cloth lined paper; Middlesex Products, Corporation, $77.90 per M sheets; Mudge Paper Company, $74.20 and $73.22; Barton, Duer & Koch Paper Company, $74.48; Whitaker Paper Company, $74.235; Stanford Paper Company, $75.50 and $74.50 less 1 per cent; Mathers-Lamm Paper Company, $74.97; Nashua Gummed & Coated Paper Company, $81.10 less 2 per cent; Graham Paper Company, $75.00 and $74.00; and Cauthorne Paper Company, Inc., $75.00 and $74.00.

For 12,000 sheets of brown and Quaker drab cloth lined paper; Middlesex Products Corp. at $114.00 per M sheets; Mudge Paper Company, $109.30 and $143.45; Whitaker Paper Company, $108.88 and $143.32; Barton, Duer & Koch Paper Company, $110.00 and $144.80; Mathers-Lamm Paper Company, $110.95 and $115.75; and Graham Paper Company, $110.00 and $144.80.

For 18,300 sheets of 22 x 28 orange cardboard; Mudge Paper Company, $51.69 per M sheets; Old Dominion Paper Company, $48.889; Barton, Duer & Koch Paper Company, $48.43; Stanford Paper Company, $48.40; Enterprise Paper Company, $54.07 less 2 per cent; Paper Corporation of U. S., $50.20; Whitaker Paper Company, $49.75; R. P. Andrews Paper Company, $48.83; Virginia Paper Company, $51.15.

For 200,000 sheets of 24 x 36 white cloth lined paper; Middlesex Products Corp., $77.90 per M sheets; Mudge Paper Company, $74.20 and $73.22; Barton, Duer & Koch Paper Company, $74.48; Whitaker Paper Company, $74.235; Stanford Paper Company, $75.50, $74.50 less 1 per cent; Mathers-Lamm Paper Company, $74.97; Nashua Gummed & Coated Paper Company, $81.10 less 2 per cent; Virginia Paper Company, $75.00 and $74.00; and Cauthorne Paper Company, Inc., $75.00 and $74.00.

For 100,000 sheets of 24 x 38, No. 64 white sulphite ledger paper and 150,000 sheets of same No. 56; Eastern Corporation, 7 cents; Whitaker Paper Company, 6.4 cents; Mudge Paper Company, 6.33 cents; R. P. Andrews Paper Company, 7.35 cents; Barton, Duer & Koch Paper Company, 7.37 cents; Stanford Paper Company, 5.99 cents; Mathers-Lamm Paper Company, 7.2 cents; Marquette Paper Company, 6.23 cents; Old Dominion Paper Company, 6.387 cents; Aetna Paper Company, 7.28 cents; and Walker Goulard Plehn Company, 6.35 cents less 1 per cent.

For 5,000 pounds of 50 per cent rag, 22½ x 28½ pink index paper same salmon, same green; and salmon 280 lbs., Old Dominion Paper Company, 19.9 cents; Aetna Paper Company, 11.21 cents; Mudge Paper Company, 12.82 cents; Walker Goulard Plehn Company, 14.77 cents; R. P. Andrews Paper Company, 12.79 cents; and Barton, Duer & Koch Paper Company, 13.38 cents.

For 33,850 pounds (350,000 sheets) of 75 per cent rag, lithograph finish map paper; Barton, Duer & Koch Paper Company, 13.25 cents; R. P. Andrews Paper Company, 13.47 cents; Mudge Paper Company, 12.11 cents; Stanford Paper Company, 17.4 cents; Old Dominion Paper Company, 19.9 cents; and Paper Corp. of U. S., 13.5 cents.

For 10,000 sheets of 22 x 28 gray photo mount board; Mudge Paper Company, $35.39 per M sheets; R. P. Andrews Paper Company, $35.33; Mathers-Lamm Paper Company, $35.40; Whitaker Paper Company, $35.05; Charles G. Stott & Company, Inc., $48.00; Hurlock Bros. Company, $46.65 less 2 per cent; M. S. Ginn & Company, $45.60 less 2 per cent; Charles W. Speidel & Company, $46.60 less 1 per cent; Barton, Duer & Koch Paper Company, $35.00 and George F. Muth & Company, $48.80 less 2 per cent.

For 410,000 pounds of newsprint paper in 32" rolls; Old Dominion Paper Company, 3.839 cents; Paper Corporation of U. S., 3.35 cents; and National Pulp & Paper Company, Inc., 2.7 cents.

India Produces More Paper

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., October 2, 1940—Curtailment of India's paper imports from Europe has proved a boon to the local paper manufacturing industry, whose mills are reported to be working at full capacity to satisfy the domestic demand for fine grades, according to a report from the American Consulate General, Calcutta. In normal times, India imported large quantities of paper and pulp from the Scandinavian countries, which have now been eliminated as sources of supply. A number of new paper mills were established in India during recent years and prior to the outbreak of hostilities continued overproduction tended to reduce prices to an unprofitable level.

At the present time, reports indicate that India's available supplies of wrapping, printing and writing papers are rapidly running short and there is increasing evidence that many Indian importers are now interested in establishing connections in the United States or Canada. In this connection, it is pointed out that there is practically no prospect of obtaining newsprint from Italian sources and at best, Japanese supplies can meet only a fraction of the Indian demand.

Referring to the outlook for importing paper from the United States and Canada, authorities in the local paper trade state that an outstanding handicap is the difficulty of securing freight space, a situation particularly true of the United States. Given reasonable quotations and timely shipments, they state, it seems certain that many dealers and importers in India would be ready to place paper orders in those markets.

Engineering and Construction for Pulp and Paper Mills*

By H. K. Ferguson[1] and G. W. Dodge[2]

Abstract

This paper is intended to outline the engineering and economic factors entering into the design and development of a construction project, the method of establishing such economic balance, and a brief review of present day conditions affecting construction costs.

Whether we are engaged in actual mill operation or in designing, selling, and installing the equipment, or in building the buildings, the engineers' responsibility must always be primarily to the men whose money is being spent. In consequence we approach seriously the question of design and construction of improved pulp and paper mills with the fixed determination that in this work we must faithfully develop these interests.

At the beginning of this depression a great many pulp and paper manufacturers found themselves with splendid engineering organizations, gathered over a period of years. Some of these organizations were reduced during the depression with the result that many plants are now operating with skeleton engineering organizations, the time of which is occupied in problems of current operation and maintenance. Much of our work of late years has come from some of these manufacturers.

With regard to the question of matters of confidential nature, it is usually the policy of worth while engineering and construction organizations to agree, in writing if desired, that they will regard the project as confidential, and if required, return all plans and specifications to the owner, at the completion of the work.

Economic Factors

In this industry, as in every industry today, there is an increasing demand for improvement in quality of product, and particularly for maintaining the uniformity of product over a long period of time. There is also the increasing demand on the part of major executives for lower production costs in order to offset the constant upward trend of costs of raw materials, labor, taxes, distribution, sales expenses, etc.

Therefore, in our discussion we will endeavor to show that the only logical method in a changing market must be to determine each important factor in the design, construction, and equipment of a new mill, or the investigation and rehabilitation of an old mill, and then to weigh each factor in the economics of that particular situation at that time and place, upon its own merits, and with its contingent background.

Someone once defined our competitors as men who can produce our own kind of product, sell at our production costs, and still make a profit. Whether we like it or not, or in spite of all that our sales force can do about it, the selling prices for products are pretty generally determined by what the market will stand. Therefore, in all seriousness, we believe it is necessary to start with the possible selling price of the product and then, working backward, weigh each economic factor involved. This is apparently the best way to find out what can be done to produce the necessary mill, machinery, and personnel which can make pulp or paper at a production cost which will leave a satisfactory profit, all within the limits of a going market for the product at that time.

In order to get a little background for our discussion, it is probable that a brief historical review of the industry may be useful. Disregarding the earlier developments of the industry beginning with the first papermaking by the Chinese, it is our thought that since a great deal of statistical information on newsprint is readily available, we can arrive at some conclusions in that branch of the paper industry, which conclusions will more or less parallel those for other types of pulp and paper.

The evolution of newsprint production is substantially as follows:

1890	120	in.	machine,	300	ft. per min.
1898	160	in.	machine,	600	ft. per min.
1920	160	in.	machine,	1000	ft. per min.
1925	304	in.	machine,	1000	ft. per min.
1930	226	in.	machine,	1500	ft. per min.

These figures indicate definitely the trend of the industry to increase and cut the cost of production simultaneously by way of increased speeds and machine widths. This is really the only simple and big answer to the problem of low cost production. Now, it is our understanding that speed is always expensive, whether it be horses, automobiles, boats, or paper machines. Therefore, this question, with others, immediately becomes one of those which must be weighed upon its merits by the development of the increased costs of the speed for definite comparison with the probable resultant savings in unit costs of production.

This policy, carried out all along the line, will make much more easy and simple the determination of site location with regard to accessibility and cost of raw materials and with regard to the facilities for storage, handling, and shipment of finished products.

Some of the results from consideration of this particular factor in this industry have been moving of newsprint manufacturing to Canada; kraft production to the south; west coast mills for low cost water route distribution over large areas; and many mills formerly making newsprint grades being converted to book and bond grades, giving way to the large, high speed newsprint mills which have taken their market away from them; also, there are definite indications at the present time of newsprint manufacture being developed in the south.

[1] The H. K. Ferguson Co., 25 W. 43rd St., New York, N. Y.
[2] Member TAPPI, Engineer, The H. K. Ferguson Co., 25 W. 43rd St., New York, N. Y.

While certain economic statistics indicate to us that American industry generally is now about 75 per cent actively engaged in production, all of us appreciate that certain factors not applicable to other types of business have already had far reaching effect on your industry. I refer particularly to such factors as:

(1) Foreign wars and their effect on the supply of raw wood and pulp.
(2) Development of pulp from brown and white paper from southern woods.
(3) Obsolescence of existing plants, some of them dating back to 1900.
(4) The substitution of cellulose products for silks, cottons and wools.
(5) Substitution of wall board and insulating board in construction work for finished wood and plaster surfaces.
(6) The development of the use of paper containers as shipping and display mediums.
(7) Advances in the improvements and control of the equipment used in the pulp and paper industry.

These and probably many more such, have set ahead the normal obsolescence date of our existing plant structures, and created a condition which calls for economic consideration in reference to new plant structures.

It is probable that the paper industry was one of the very first to develop a substantially continuous process for production from raw material to finished product, approximating also the highly desirable straight line layout. Operating generally on a 24-hour basis it became, some years ago, an ideal for students of industrial production in other industries who were endeavoring to put their foundries, their automobile production, their chemical manufacturing, and even their bakeries, on a continuous instead of a batch basis. Many industries have, therefore, benefited from the example set by papermaking. In these days, however, a noticeable reversal in the tide has occurred, to the extent that the paper industry has for some years now actually been benefiting, by adapting to its own purposes some of the continuous operation devices developed in other industries.

Specific examples are such developments as remote controls, the accumulating, and automatic blending of various component parts of "furnish", automatic temperature and pressure controls, etc.

Actually, continuous process and continuous research go hand in hand, for the reason that a constant demand for improvements in quality, and uniformity, and reductions in cost require continuous clear thinking along the lines of the possible usefulness in any industry of new types of raw materials for bleach or other purposes, and new types of major or auxiliary manufacturing equipment. There is, however, always the possibility that a thing which is theoretically good on a research basis must be seriously modified to make it practicable from a manufacturing standpoint, particularly when put under the microscope of our test of actual advantages *versus* disadvantages.

In working out the higher speed machines for papermaking, southern manufacturers have been particularly alert, in that they have endeavored to make the whole process actually continuous, eliminating beaters at batch devices, and developing refiners to complete stock preparation by continuous flow from raw material to the wet end of the machine.

Determining Factors for New Pulp or Paper Mill

All of this preliminary discussion is leading us toward the development and description of a good and simple method for the definite determination of all the factors entering into the question of the design, construction, and equipment of a new pulp or paper mill, or the rehabilitation of an existing property.

It is our definite belief that in developing the basis for experienced engineering judgment there is no better method than to first take up all matters of a controversial nature, judge each on its own merits, and then set down what is frequently called the "deadly parallel" of comparison. We, therefore, recommend that in approaching the determination of factors involved, we draw a definite line down the center of various sheets of blank paper, setting down on the left hand side all the advantages for any particular site, type of raw material, selection of any particular type of manufacturing equipment, the various possible arrangements of the equipment, and the types and dimensions of the buildings to house it. On the other side of the line should be placed, after careful investigation, all the disadvantages of each item, so that decisions can finally be based definitely upon a clean cut statement of actually developed advantages *versus* disadvantages, with experienced engineering judgment deciding between the two in such a way that each component part of the whole scheme is selected on the basis of clear thinking and justifiable conclusions.

It is our definite belief that pulp and paper mills, designed, equipped, and built upon this basis, will continuously develop lower costs than other mills, too many of which in the past have been designed too much by rule of thumb and inbred and prejudiced thinking. Some specific instances may help to prove our point.

For an example, bearing in mind that we are constantly limited by selling prices determined in a more or less open market, improvement in quality and the demand for continuously uniform products have forced many of you into a change from old type wooden tanks to tile lined, concrete chests with modern high speed agitation and designed for quick and complete emptying and cleaning when needed. Similarly, the use of modern alloy or cement-lined piping for the elimination of slime and dirt, together with new type valves and fittings with which they are equipped, extends the natural life of the systems, reduces maintenance cost, and eliminates variables in quality of product due to dirt and slime accumulation.

It is our belief that all big ideas are simple. Having, therefore, established a definite, simple way for determining various factors which enter into the design, construction, and equipment of a paper mill, it is probable that some current information with regard to the increase of construction costs and possible outlook for the future may be interesting.

Since 1932, because of increased taxes on corporate income required for construction purposes; social security burden on wages; and because of state sales, or use taxes, etc., all of which apply not only to the direct labor involved in a new mill, but also to the equipment and much of the material which goes into the work, there has been an overall increase of more than 11 per cent in the completed cost of such products. This increase has been partly compensated for by reductions in the prices of certain materials and equipment based upon improved design and processing in the plants manufacturing these products, and because of lower selling costs and distribution expense. On the other hand, the trend of capital cost is continually upward.

Fixed charges are an important part of the de-

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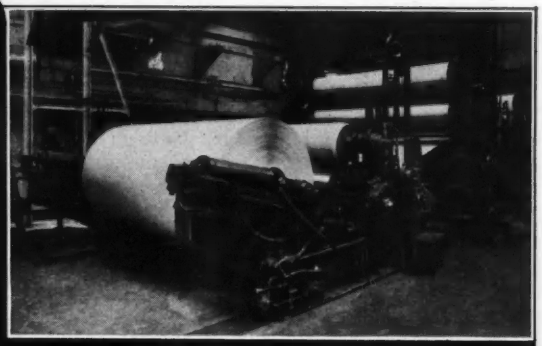
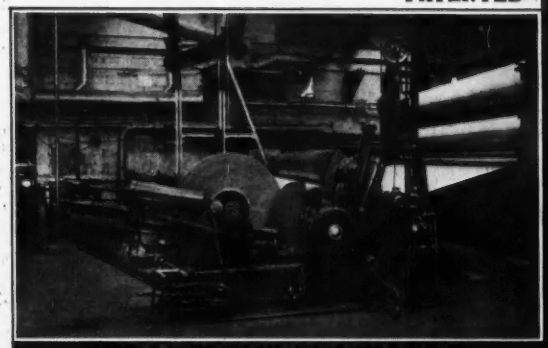
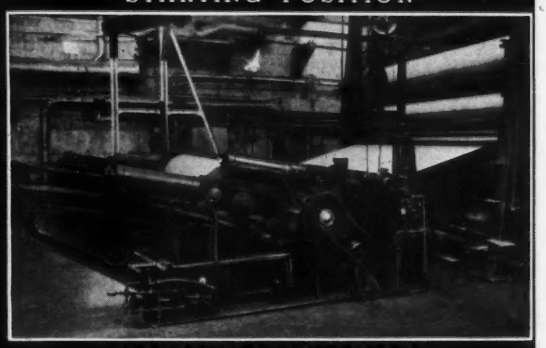


STARTING POSITION



FINAL WINDING POSITION



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velopment of production costs in any plant. An important chemical manufacturer has in the last few years derived a considerable advantage, because of the fact that he had on hand currently developed plans, specifications, and estimates, for a complete new plant in a strategic location. This enabled him to take advantage of a low spot in the market in 1932 and 1933, to build a new plant and put it in production. His competitors, designing and building their plants in the following years at much higher costs, are now subject constantly to a serious increase in fixed charges which gives him a definite market advantage.

It is our belief that no major executive of a pulp or paper mill enterprise should fail to keep before himself constantly various definite alternatives as to what he can do, if and when certain exigent circumstances arrive in his industry which are likely to warrant definite major action in connection with his plant. Such alternate decisions may be very dangerous, unless they are based on carefully worked out and sound engineering and accounting practice over a reasonable period of time. Too many new plants, built on too quick decisions, have proved to be white elephants later.

The composite opinion on construction costs, as reported in the *Engineering News-Record*, indicates that from the post-depression period of 1932 to date the building costs have increased from the index figure of 150 to 180. The effort of engineers and contractors has kept this increase to a minimum, partly by the use of efficient building methods, and further by such items as the use of ready mixed concrete, quick setting and acidproof cement, the use of various materials other than brick for walls, continuous welded steel shapes, welded vessels, etc.

Development of Construction Program

Based upon current conditions it is our further conclusion that no pulp or paper manufacturer at this time should build anything which he can possibly avoid building, particularly unless his plant is so arranged that he can break even or better on 70 per cent production. On this basis it is, therefore, logical to assume that in order to keep himself and his company properly protected, he should at all times have developed currently the basic information which will enable him to build quickly and without interruption to existing production, if and when the advantages of such a program specifically outweigh the disadvantages.

While it is fundamental that the entire selection of equipment and its arrangement for a new mill should be determined on the basis of proper and careful selection by "the deadly parallel" method as previously outlined, it is also equally true that the selection of the type of building for housing some of the new machinery, the production, and the finished product should be done on a similar basis. In the old days, stone, timber, and brick were the materials mainly used in the construction of paper mills. Now, concrete, steel, and some brick, with wood or other roofs, are generally in vogue. Today, due to increased cost for field labor for construction work throughout the country, for reasons beyond the control of any of us, in some areas a considerable amount of careful judgment is required for the selection of the proper materials for new buildings.

For example, in some places concrete aggregate materials and labor may be low in cost, which indicates definitely that the pendulum of advantage would swing toward a considerable use of concrete. On the other hand, labor costs and concrete aggregate materials may be very high in price, which normally would indicate the need of careful investigation to find out how much this burden may be relieved by the use of other materials.

In designing mills, such questions as condensation, interior temperature, cleanliness, proper lighting, and ventilation are all of paramount importance Since it is obviously impossible to make up any standard rules for design or construction which will fit all cases equally well, it becomes apparent that these factors in construction must evidently be weighed on the basis of the advantages or disadvantages of the various types of ample and intelligent engineering designs, based upon the background of experience developed in such cases, particularly when the questions of length of life of structure and low maintenance costs are as important as they are today.

Possible Improvements in Designs and Processes

The advancement of a new important, influencing factor in your process of manufacture may affect either favorably or unfavorably the capital cost of your plant structures. The keenness of paper mill engineers and equipment designers in visualizing the need of improvement in process methods is continually contributing to this effect.

Some of the possibilities are:

(1) Continuous and controlled stock preparation, including the hydrating and refining equipment design, may reduce power cost per ton of finished product.
(2) Sheet formation, as particularly related to the Fourdrinier wire and its water removal properties, may need considerable research.
(3) Machine coating and finishing as a continuous process, with the elimination of festoon driers is worth investigation.
(4) Automatic sorting, counting, and finishing still sounds fantastic to some manufacturers, but these operations are a reality.
(5) Reduction of finished broken and remaking cost of same directly affects the uniformity of finished product.
(6) Recovery of white water waste, including chemicals, fillers and stock, and the economic reuse of such recovered furnish in the process is important.
(7) The need for the elimination of foam is still evident in many mills.
(8) Efficient moisture removal from the pulp and paper may have a far reaching effect on the plant designs and overall efficiency.

There are many unsolved problems involving elements which at present contribute to the increased conversion cost in pulp- and papermaking.

This paper would probably not be complete without a final plea for the selection, development, and training of able men as plant engineers, who can take more important positions in the development of plant policy as to choice of equipment, its arrangement and layout, and its service, and are in consequence, able to assume increasingly more important positions in the industry.

Pennsylvania Seeks More Pulpwood

[FROM OUR REGULAR CORRESPONDENT]

HARRISBURG, Pa., September 30, 1940.—Faster-growing poplars for the production of pulpwood, to meet the increasing demand resulting from cessation of foreign imports, is the aim of the Department of Forests and Waters.

Pennsylvania annually produces only about half of its total consumption of pulpwood and since imports from foreign countries have practically ceased, the development of rapidly growing species of trees suitable for pulpwood is being given special attention by the department.

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Paper makers are also using synthetic resins for marproof, fast curing board coatings, paler overprint varnishes and lacquers and better wax treatments.

Write to Reichhold for more complete information on the use of RCI synthetic resins in the paper industry.

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N. P. T. A. MEETING AT CHICAGO WELL ATTENDED

(Continued from page 9)

fine explanation of FBI work in investigating fifth columnists by W. S. Deveraux of the Federal Bureau of Investigation. E. W. Tinker, secretary of A. P. & P. A. gave a short analysis of the present day conditions in the paper industry. Easily the feature of the luncheon was the presentation of mementos to seven living charter members of N.P.T.A. John L. Richey, secretary of the Club, gave a most excellent tribute to these pioneers in paper organization work.

The Fine Paper Division met Tuesday afternoon and listened to a combined motion picture-address feature given by W. Floyd Maxwell, secretary of the Lithographers National Association. The entire presentation combined to give fine paper executives an accurate picture of the way in which the lithography industry is cooperating and making suggestions in increasing sales of paper throughout the country.

The Board of Governors, with President P. W. Lesh presiding, met during the evening hours and, according to reports, spent much of the time defining the reactions of various branches of the industry to the open meeting discussions on the first day.

Important Association Meetings on Wednesday

The final day of the session was mostly given over to routine matters which proved invaluable in bringing members up to date as to developments along many lines. The Fine Paper Division met to hear a report on postal matters by Thomas Quinn Beasley while reports on book papers and cover papers were presented by B. E. Reeves and W. W. White, respective committee chairmen. An interesting and resultful conference of local Secretaries and Executives with the National Counsel filled the lunch hour period. Here the men on the firing line compared notes, probed for the answers to administrative trends in Washington, analyzed what was expected of the industry and sought to further develop that more complete integration of the entire trade as urged by Mr. Javits at earlier sessions.

P. W. Lesh Presides at Divisional Meeting

During the closing afternoon President P. W. Lesh presided at the semi-annual meeting of the Fine and Wrapping Paper Divisions and presented a most interesting report of what the paper industry is doing to meet conditions in a very critical time. Reports of the Board, the Treasurer (indicating increased approval of the policies of the Association and increased membership support), the Executive Committee and of the Fair Labor Standards Committee, rounded out the three day program.

On Thursday a record breaking crowd of golfers journeyed to Olympia Fields Country Club to participate in the final golf outing sponsored by the midwest division of the Salesmens Association of the Paper Industry. Spontaneous in its execution and characterized by the usual song fests and good fellowship, the outing reacted fully to the credit of Pat Patterson of Flambeau who still played in luck by presenting out of town guests with perfect fall weather.

Space does not permit more than a listing of the exhibitors. However, those in attendance were impressed by the orderly way in which everything was handled and that they liked the actual exhibits was evidenced by the large number of men who visited the displays. The list of exhibitors is as follows:

All exhibits were on the fifth and sixth floors of the Stevens Hotel and the list of firms participating follows:

Ajax Box Company; Allied Paper Bag Company; Alwin Manufacturing Company; American Paper Goods Company; American Paper Merchant; Bay West Paper Company; Better Packages, Inc., Brown Company; Central Paper Company of Menasha; Central Paper Company of Muskegon; Cleveland Mill & Power Company; Container Corporation of America; Continental Bag Specialties Corporation; The Converter; Crystal Tissue Company; Dixie-Vortex Company; Dobeckmun Company; Fort Howard Paper Company; Freeman Paper Company; John M. Hart Company; Hobert Paper Mills; Hooven & Allison Company; Howard Paper Company; Howard Publishing Company; Lily-Tulip Cup Corporation; Loroco Industries, Inc., Maryland Paper Products Company; McLaurin-Jones Company; Menasha Products Company; Midland Products, Inc., Mid-States Gummed Paper Company; National Soda Straw Company; Nekoosa-Edwards Paper Company; Northwest Paper Company; Orchard Paper Company; Oval Wood Dish Corporation; Pejepscot Paper Company; Racquette River Paper Company; Rexford Paper Company; Sanitor Manufacturing Company; William Schwartz; Sealright Company; Self-Locking Carton Company; Sherman Paper Products Corporation; Sorg Paper Company; Superior-Lawrence Bag Company; Sutherland Paper Company; Tomahawk Kraft Paper Company; Union Bag & Paper Corporation; United Paper Company; Universal Paper Products Company; Victoria Paper Mills Company and Wisconsin Tissue Mills.

Japan Imports More Pulpwood

[FROM OUR REGULAR CORRESPONDENT]

VANCOUVER, B. C., September 27, 1940—The Nisso Rayon Pulp Company and Canada Lumber Company, two Japanese firms holding timber concessions in British Columbia, imported to Japan in the year ended March, 1940, 45.6 million board feet of lumber, 95 per cent of the 48 million board feet which had been anticipated. Of this total 24 million board feet was imported by the Canada Lumber Company on behalf of Nokuestu Paper Company for the manufacture of paper plup. The remaining 22.5 million board feet of the Nisso Pulp Company was for the manufacture of pulp.

Prospects for importation during the current fiscal year are reported to be good. It is expected that the total will equal that shipped during the 1939-40 fiscal year.

It is reported that the Japanese company will make intensive efforts to ship out greater quantities of timber from the concession areas. In previous years imports have included timber purchases outside the concession.

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Company.....

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Obituary

Charles I. McLaughlin

Charles Irvine McLaughlin, former treasurer and a director of Louis Dejonge & Company, New York, died September 26 in his home at New Rochelle, N. Y. at the age of 87. He had been with the company for fifty-nine years, and at his death was a director of the Sunray Oil Company of New York and Oklahoma.

Mr. McLaughlin, who was born in Augusta, Ga., was graduated in 1875 from New York University with a degree in chemistry. He was a Mason, a member of the New York Athletic Club and former director of the Atlantic Yacht Club.

He leaves a widow, Mrs. Julia Dean McLaughlin, and a daughter, Mrs. Edith Groesbeck of Schenectady, N. Y.

Edwin A. Lydall

Edwin A. Lydall, 70, secretary and treasurer of Lydall and Foulds Paper Company, Manchester, Conn. died suddenly on September 20 at his home, 280 Main Street, after a short illness.

A native of this town, he spent all his life here and for more than 40 years was associated with the Lydall and Foulds plant. He was also secretary and treasurer of the Manchester Water Company, a private utility serving home owners in the north end.

He leaves his wife, Mrs. Lula M. Lydall.

The Lydall family came here nearly 70 years ago from New Britain and first started manufacturing knitting needles and wire specialties and later turned to the manufacture of paper. The firm now has three plants in the north end: Lydall and Foulds Paper Company, started in 1899; the William Foulds Company, organized in 1902; and the Colonial Board Company, founded in 1913.

Max Kaplan

Max Kaplan, aged 68 years treasurer of the Middlesex Paper Tube Company, Lowell, Mass., and charter member of Temple Beth-el, died September 23 at the Lowell General hospital after a week's illness. He made his home at 105 Gates street.

Mr. Kaplan was active in the business affairs of the city and took a prominent part in the Jewish fraternal organizations here. He was well known throughout Lowell due to his business affiliations.

He is survived by six children.

Mr. Kaplan was a charter member of Temple Beth-el, a member of B'nai B'rith, Knights of Pythias and the local synagog.

Funeral services were held at the home, 105 Gates street, with burial in Beth Israel cemetery, Pelham, N. H.

Simplified Practice for Ice Cream Cartons

WASHINGTON, D. C., September 30, 1940—The Division of Simplified Practice of the National Bureau of Standards has announced that Simplified Practice Recommendation R120-40, Ice Cream Brick Molds and Cartons, is now available in printed form. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for five cents each.

This recommendation, which originally became effective in 1931, established a simplified schedule of dimensions for the two-gallon mold and for a pint and quart carton. The first revision, effective in 1936, amplified the schedule to include recommended standard dimensions for the linerless, machine-filled type of carton in the pint and quart sizes.

The current revised recommendation, which is effective from June 30, 1940, includes standard dimensions for a pint carton to fit ice trays in household refrigerators.

Canadian Forestry Corps at Full Strength

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., October 1, 1940—The Canadian Forestry Corps, recently mobilized into the Canadian Active Service Force, has reached full strength and has been undergoing training at central camps. The corps is under the command of Brigadier-General John B. White, D.S.O., E.D., of Montreal, vice-president of the Canadian International Paper Company, who commanded the Canadian Forestry Corps in France in the last war and who was deputy director of timber operations with the British armies. Second in command is Col. Garnet M. Strong, D.S.O., while Maj. C. E. F. Jones is D.A.A. & Q.M.G. Officers commanding No. 2 and No. 9 Companies, from Montreal, are Maj. J. H. Dunlop and Maj. C. Roy McCort, respectively.

From Forest to Newsprint

An interesting presentment of the manufacture of newsprint paper, under the title of "From Forest to Newsprint," has been written and published by S. F. Sorensen, Bucksport, Me. The author, a cost accountant for some years with the Maine Seaboard Paper Company, has reproduced in mimeograph form, the story of newsprint paper down to the operation of the first newsprint mill in the South in 1939. The chemical properties of wood and its handling at the pulp mill, concise explanations of the sulphite and sulphate processes and the formation of paper on the Fourdrinier are given. The narrative concludes with a brief outline of the development of newsprint in the South and information on the economic status of the paper and pulp industry.

Red Mill at Montville Burned

NORWICH, Conn., October 2, 1940—The Red Mill only recently put into operation by the new owner, the Red Mill Paper Board Company at Montville, Conn., which has been making a better grade of boxboard, was seriously damaged by fire on September 28. The cause of the fire has not as yet been ascertained. The storage buildings, housing a large amount of paper stock, the beater room with its machines and part of the wet end of the five-cylinder machine have been destroyed as well as a steam engine and the roof of the boiler room. The mill will be rebuilt and it is hoped that operations can be resumed shortly.

Irwin F. Megargee Resigns

Irwin F. Megargee has resigned as vice-president and sales manager of the Curtis Paper Company of Newark, Del. Mr. Megargee has not as yet announced his plans for the future.

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  20 to 100 ft. tank dia.
- **All Treatments and Chemicals**
  Turbidity and color removal—alum, ferric sulfate, ferric chloride or copperas, with or without lime.
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  Odor or Taste Removal—activated carbon and/or chlorine, plus other chemicals.
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  Sludge thickened within unit, without use of separate, outside thickeners.
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  Water must pass through layer of subsiding solids which enmeshes finest and most difficult particles.
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  Incoming raw water mixed with previously formed flocs to accelerate precipitation.

★ If your process water is *turbid, colored* or *hard*, a Dorrco Hydro-Treator will purify it to meet your plant requirements.

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The principle underlying the Dorrco Hydro-Treator is based on time-proved practices demonstrated by us at fifty or more large municipal water purification plants treating up to 100 million gallons a day each.

The Dorrco Hydro-Treator brings big plant standards of municipal water purification within the range of industrial plants requiring 50,000 to several million gallons a day of pure process water.

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FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending October 2, 1940

	High	Low	Last
A. P. W.	....	....	....
Armstrong Cork Co.	37	35¾	36¼
Celotex Corp.	7⅜	6¾	7⅜
Celotex Corp., pf.	62	57⅞	62
Certain-Teed Products Corp.	5½	5	5⅜
Certain-Teed Products Corp., pf.	33½	29¾	31½
Champion Paper & Fibre Co.	22¼	22½	22¾
Champion Paper & Fibre Co., pf.	102¼	101	102
Congoleum-Nairn Co.	18	17⅛	18
Container Corp. of America	14¾	14	14⅝
Continental-Diamond Fibre Co.	6½	6⅜	6½
Crown-Zellerbach Co.	15⅝	15	15⅜
Crown-Zellerbach Co., pf.	87	86½	87
Flintkote Co.	18	15½	18
Robert Gair	3¼	2⅜	3⅛
Robert Gair, pf.	16¾	14⅜	16¾
International Paper & Power	15⅞	13⅜	15
International Paper & Power, pf.	60⅜	57½	60½
Johns-Manville Corp.	70½	67½	70¼
Johns-Manville Corp., pf.	126¾	126	126
Kimberly-Clark Corp.	35½	35½	35½
MacAndrews & Forbes	28¾	28⅜	28¾
MacAndrews & Forbes, pf.	....	....	....
Masonite Corp.	30	29¼	29¾
Mead Corp.	9⅛	8⅜	9⅛
Mead Corp., pf.	68	67	68
Paraffine Companies, Inc.	37½	37	37½
Paraffine Companies, Inc., pf.	100	100	100
Rayonier, Inc.	17⅜	16	17⅜
Rayonier, Inc., pf.	30	29	30
Ruberoid Co.	17	15½	17
Scott Paper Co.	42	41¼	41¼
Scott Paper Co., pf.	109	108	109
Sutherland Paper Co.	24⅞	24⅝	24⅝
Union Bag & Paper Corp.	12⅝	11¾	12⅝
United Paperboard Co.	3⅝	3⅜	3⅜
U. S. Gypsum Co.	80	76½	79¾
U. S. Gypsum Co., pf.	176	176	176

New York Curb Exchange

High, Low and Last for Week Ending October 2, 1940

	High	Low	Last
American Box Board Co.	....	....	....
Brown Co., pf.	20	19	19⅜
Great Northern Paper	40	40	40
National Container Corp.	11⅞	11	11⅜
St. Regis Paper Co.	2⅞	2¾	2¾
St. Regis Paper Co., pf.	71	69½	70¾
Taggart Corp.	3⅜	3⅜	3⅜

Gaylord Proposes Loan

Details of a proposed $5,000,000 loan to be borrowed from five banks by the Gaylord Container Corporation were disclosed in a notice sent to preferred stockholders and made public at the New York Stock Exchange recently. The proceeds will be used to expand and improve the corporation's plants at Bogalusa, La.

The banks with which the credit agreement has been made are the Bankers Trust Company of New York; the First National Bank, the Mercantile-Commerce Bank & Trust Company, and the Boatmen's National Bank, all of St. Louis, and the Marine Trust Company of Buffalo. The proxy notice states that the management will immediately proceed with the loans unless 33 per cent of the stock is voted against the proposal within twenty days after the notice is mailed.

The borrowing must be done within two years from the date of the credit agreement. One-sixth of the amount borrowed must be repaid in two years, and one twelfth of the amount each six months thereafter. The loans will bear interest of 2½ per cent a year.

One section of the agreement states that while the corporation's net quick assets are less than the principal amount of the borrowings dividends may not be paid in excess of $275,000 a year, or in excess of one-half of the increase in consolidated net quick assets for such period, whichever is greater. If the net quick assets are greater than the borrowings, but less than 110 per cent of them, the dividend on the common stock cannot exceed $1 a year.

There is no limitation on the dividends to be paid if the net quick assets exceed 110 per cent of the borrowings. The Gaylord Container Corporation is not required to deposit any property as security, although mortgaging is generally forbidden by the agreement.

Masonite Earns $629,850

Ben Alexander, president of the Masonite Corporation, has announced net profits for the fourth quarter of $629,850.74, an increase of 36 per cent over net profits for the corresponding period last year. The report covers the 12 weeks ended August 31.

The earnings, calculated after depreciation, income taxes and other deductions but still subject to final audit, equal $1.13 for each of the 539,210 shares of outstanding common stock, after provision for preferred dividends. Earnings for the corresponding period last year amounted to $461,746.41 or 82 cents a share.

For the fiscal year ended August 31, net profits totalled $1,659,348.08 or $2.91 a share. This represents an increase of 43 per cent over profits of $1,163,049.72 or $1.99 a share for the preceding fiscal year.

Sales for the 12-weeks period ended August 31 totalled $2,313,120.08 as compared with $2,187,334.95 for the corresponding period in the preceding fiscal year. Sales for the entire fiscal year just closed totalled $9,163,345.35 as compared with $7,346,628.65 the previous fiscal year, an increase of 25 per cent.

Mr. Alexander pointed out that three factors have been influential in swelling the company's volume of business. First, he said, increased industrial activity had probably the greatest effect. More than half of Masonite's production goes into industrial channels.

Secondly, he said, the increase in private home construction has resulted in the greatest sales in this market since 1929.

And finally, Mr. Alexander pointed out, the national preparedness program has in recent months resulted in large volume sales of the company's products for use in barracks, shelters and various other types of military or semi-military structures.

A. P. W. Properties Net $12,960

The A. P. W. Properties, Inc. (Controlled by A. P. W. Paper Company) reported for the year to June 30 a net income of $12,960, equal, after dividend requirements on Class A preferred, to 3 cents a share on 7,407 common shares, against $15,113, or 32 cents a common share, in the preceding fiscal year.

Apply For Hearing on Brown Plan

Court application is being made to set a date for hearing on the Brown Company plan of reorganization, Serge Semenenke, chairman of the reorganiza-

tion managers, announced on September 28. The plan has been accepted by two-thirds of the bondholders, by two-thirds of the general creditors and by more than a majority of the common and preferred stock of the $40,000,000 New England pulp and paper concern, now operating under Section 77-B of the bankruptcy act.

All bondholders, general creditors and preferred stockholders who have not yet accepted the plan are urged to do so promptly, in order to assure the completion of the reorganization.

Directors Proposed for A.P.W. Co.

Dwight G. W. Hollister, president of the A. P. W. Paper Company, Inc., owned 1,851 shares of the company's common stock on August 31. Seven directors are proposed for re-election at the annual meeting on October 16. Only two directors in addition to Mr. Hollister own common stock. They are Ledyard Gogswell, 1,540 shares and Charles J. McCullough, 20 shares. Mr. Hollister is also president of the American Public Welfare Trust which is the beneficial owner of 36,656 common shares and $162,000 of the company's convertible notes. He received $8,786 in salary in the year ended June 30.

Bartgis Bros. Vote Dividend

The directors of the Bartgis Brothers Company have declared on September 20, the regular quarterly preferred dividend of 37½ cent per share on the outstanding preferred stock of the Company payable September 30, 1940, to holders of record September 20, 1940.

The directors have also declared a dividend of 10 cents per share on the outstanding common stock of the Company payable October 31, 1940, to holders of record October 10, 1940.

Certain-teed Nets $2.31

The Certain-teed Products Corporation and wholly owned subsidiaries for six month to June 30 reports a net profit of $168,581, or $2.31 a share on 73,069 shares of 6 per cent prior preferred stock on which there is an accumulation of unpaid dividends. Net profit in last year's period was $1,992, or 3 cents a share on the preferred stock. These results do not include any earnings of Sloane-Blabon Corporation.

S. D. Warren Earns $199,454

The S. D. Warren Company for the six months to June 30 reports a net income of $199,454, equal to $1.97 a share on 101,387 shares, against $139,885, or $1.38 a share, in 1939 period; net sales, $5,118,952, against $4,423,009.

Sabin Robbins Nets $135,936

The Sabin Robbins Paper Company for the year to June 30 reports a net income, of $135,936, compared with $49,085 earned in preceding fiscal year.

Robertson Box Profits Rise

The Robertson Paper Box Company for 1939 reports a net income of $88,094, against $74,078 in 1939.

Paper Shipments into New York Area

Over 63% of the paper manufacturers, questioned in the course of a recent survey, are making regular carload shipments into New York City and the Metropolitan Area, as compared to 36% making pool car shipments. These figures apply to shippers within a 250 mile radius of New York City. According to the survey 48% ship by truck, 22% ship by boat, and a total of 99% use the rails. Many use more than one means of shipping.

The survey was conducted among several hundred representative manufacturers of paper, paper pulp, and paper products, located in important paper centers all over the country. Shipping practices were plumbed by American Market Surveys in order to gather information for a comprehensive study of the requirements of present-day shippers.

Primary question of the survey was: What types of carriers are being used to bring paper shipments into the New York Area? Other questions had to do with the volume of tonnage and the number of pool car shippers who are required to furnish trucking at the New York end. The survey was made among large and small manufacturers and tonnage varied from twenty to thirty carloads every week to a considerably smaller number of pool car shipments. Of those making carload shipments to New York, according to the survey, 25% at the present time are required to furnish trucking.

One of the vital purposes of the study was to check on the needs of shippers for improved trucking service and trucking facilities. On this score, 29% of those who responded pointed to the need for quicker handling. 26% called for a more thorough check on shortages and on the general condition of shipments—while 13% wanted more efficient and reliable follow-through, and 11% stressed need for more adequate warehouse and railroad siding facilities.

Another question dealt with the railroads now transporting paper into New York. In this connection the New York Central and the Pennsylvania led from the south and west, and the New York, New Haven & Hartford led from New England. Here are the exact percentages, according to the survey: 57% ship by New York Central, 38% ship by Pennsylvania, 30% ship by New York, New Haven & Hartford, 21% ship by Lackawanna, 19% ship by Erie, 19% ship by Baltimore & Ohio, 19% ship by Lehigh Valley, 15% ship by Central. In over half the cases, total shipping is being divided between two or more roads.

Almost all of the shippers questioned have occasion to make deliveries in New Jersey, Northern New York, New England, and overseas. However, only 15% take advantage of stop-offs intermediate to New York or arrange to ship carloads for partial unloading at New York, with destination beyond. On the other hand, the survey reveals that it is in pool car shipments that consignments are made to New York for shipment to points beyond.

For instance, 65% include shipments in pool cars for Newark and other Jersey points; 63% do the same for export shipments; and 41% for New England with 24% for Northern New York.

Indianapolis Is Optimistic

[FROM OUR REGULAR CORRESPONDENT]

INDIANAPOLIS, Ind., September 30, 1940—While the general trend of the wholesale paper market in this territory is unchanged, there is an underground current of optimism among most of the trade for early winter business. The fine paper market continues about the same. Local printers are taking only their immediate requirements and at the present time these are not large. Printers in smaller areas, however, seem to be better favored according to orders reaching the local trade. At that the demand is a bit higher than it was a year ago and there appear to be no disturbing factors in the market that would cause any change. Prices continue firm with a slightly stronger tendency in some lines, but the local trade intends to make every effort to keep prices from anything resembling a runaway market.

The bright spot of the entire market continues to be the demand for building and roofing papers. The year has been one of the best on record and given an open winter, building will continue during most of it. The fall demand is more than last year and promises to continue late. Dealers are buying cautiously, however, with their minds on well balanced stocks rather than large stocks.

Cool weather arrived during the last week and demand for summer specialties dropped considerably. The milk and ice cream trade demand for napkins, containers and other equipment continued good, however. The holdover stocks in hands of retailers will be small.

Paper box demand continues good and Indiana factories are working almost to capacity, though some have cut off their extra shifts or gone from three to two eight-hour shifts. Those catering to the holiday trade report a good advance business and predict it will be higher than it was a year ago.

The paper stock and rag markets are little changed. However, there has been a slight increase in demand for poorer grades of waste paper and prices are a trifle stronger. Local warehouses are fairly well filled and a rise in price likely will cause some heavy selling.

Adopt New Labeling System for Tissue

The recent revision of Simplified Practice Recommendation R46-39 permitted the manufacturers of tissue paper for wrapping purposes to improve materially their labeling plan so that it now affords greater protection than ever before to the buyers of this type of paper. Taking advantage of the change which eliminated the old label from the Simplified Practice Recommendation of the United States Department of Commerce, The Tissue Association has brought out and copyrighted a new and attractive two-color label.

Manufacturers of wrapping tissue are being licensed to use this label under strict regulations which guarantee that the paper meets the standards set forth in the Simplified Practice Recommendation for Tissue Paper (SPR46-39). The License Agreement signed by these manufacturers carries with it adequate provisions for testing and furthermore permits of policing the use of the labels as was not previously possible.

When a question as to count, size or quality arises, samples will be submitted to the Tissue Association which will in turn send them to the Electrical Testing Laboratories of New York City for testing in accordance with the requirements of the Simplified Practice Recommendation. If any cases are found where the paper does not meet the standards of the label on the package, The Tissue Association will then take immediate steps to protect the consumer's interest and to discipline the manufacturer who has misused the label. If necessary, for the full protection of the consumer the manufacturer's license to use the T.T.A. label will be immediately revoked and will not be renewed until the association has received fully, satisfactory guarantees that his product will meet all standards in the future.

The new labeling program is further evidence that the manufacturers in the Tissue Paper Industry believe that lasting prosperity is dependent on fair treatment of the consuming public. Previous experiences with the labeling program for wrapping tissue and with other measures to prevent the consuming public from being imposed upon have definitely shown the soundness of this policy. It is the belief of the wrapping tissue manufacturers who are supporting this labeling program that the revised program will meet with strong support not only from distributors and buyers but also from State and other officials charged with the duty of protecting the interest of the general public.

Superintendents Elect Officers

At a banquet and meeting of the Northeastern and Connecticut Valley Divisions of the American Pulp and Paper Mill Superintendents' Association at Poland Spring, Maine, the following officers were chosen:—

Northeastern Division, chairman, Aubrey Crabtree, Madawaska, Me.; vice-chairmen, R. M. Wishart, Rumford, and Maurice F. McCarthy, Waterville; secretary-treasurer, Mrs. Marian L. Stewart, Lincoln, N. H.

Connecticut Valley Division, chairman, Monroe O. Morris, Burnside, Conn.; vice-chairmen, Leroy Frisbee, Russell, Mass., and Ollie W. Messner, Montville, Conn.; secretary-treasurer, Thomas C. Bowen, Holyoke, Mass.

N. E. Fine Paper Men To Hold Luncheon

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., September 30, 1940—A luncheon meeting of the Fine Paper Division of the New England Paper Merchants Association is to be held Thursday at the Boston Chamber of Commerce at which John H. Brewer is to report on the proceedings of the convention of the National Paper Trade Association at Chicago. Howard Patterson, of the Graphic Arts Institute is to discuss what the Graphic Arts proposes to do in connection with the 500th anniversary of the printing industry.

New Literature

Propeller pumps are described in Bulletin 6360, issued by Fairbanks, Morse & Company, 600 South Michigan avenue, Chicago, Ill. It covers the new line of Figure 6360 mixed flow, vertical propeller pumps and is of particular interest to engineers and others interested in large capacity pumping operations.

Pressure reducing and desuperheating control is explained in Bulletin No. 107-A, issued by the Bailey Meter Company, 1050 Ivanhoe road, Cleveland, Ohio. It includes diagrammatic arrangements, installations and chart-record operations of typical systems.

The Howell, Bunger valve is described in Bulletin No. 144, issued by the S. Morgan Smith Company, York, Pa. Typical installations of these valves, offered in standard designs and diameters from 36 inches to 84 inches, are given.

A "study of the beater" is the title of a 64-page booklet issued in a new edition by E. D. Jones & Sons Company, Pittsfield, Mass. It contains much data on beater operation, formulas, charts, etc., of particular interest to mill men.

Liquid level meters are discussed in Publication 1990, issued by the Cochrane Corporation, 17th street and Allegheny avenue, Philadelphia, Pa. It covers six different styles of mechanical and electric operated liquid level meters, including a new design of the potentiometer type. Application drawings and technical data are included.

Leather belting is the subject of a booklet issued by J. E. Rhoads & Sons, 35 North Sixth street, Philadelphia, Pa. It contains information on the company's Tannate leather belting and gives information useful to men working with mechanical power transmission machinery.

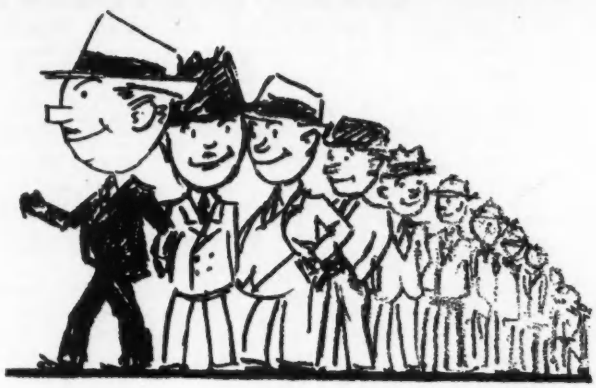
The Farval Dualine, Jr. centralized system of lubrication is the subject of Bulletin No. 10-A, issued by The Farval Corporation, 3255 East 80th street, Cleveland, Ohio. It describes a new, small Farval centralized system of lubrication for oil or grease to any number of bearings on smaller machines, and embodies the principles of the Dualine system in use on many types of machines in heavy industries.

Bulletin 6930R, is a newly revised publication describing the Fairbanks-Morse, Figure 6930, water lubricated turbine pumps with open impellers.

Gasket handbook, a new 64-page manual and catalogue, No. 35, has just been issued by The Goetze Gasket and Packing Company, New Brunswick, N. J. This new handbook replaces all literature formerly issued by the company. It contains advanced engineering data developed in the Goetze research laboratory and shows many new and improved products, with size and price information.

"Power Transmission Practice In Paper Mills," is the title of a new publication issued by Link-Belt Company, 307 N. Michigan avenue, Chicago, Ill. It particularly covers applications of silent chain drives and P.I.V. gear variable speed transmissions to paper mill machinery, and contains numerous illustrations of actual installations. Dollars-and-cents figures and comparative drive data are given under such headings as first cost; power waste; production loss; sustained efficiency and maintenance.

Grapples for handling pulpwood are described in a bulletin issued by The Owen Bucket Company, 550 Breakwater avenue, Cleveland, Ohio. It describes the Owen principle of independent operation of the tines and briefly explains the distinctive design, construction and operation of Owen grapples.



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LINE-UP
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CONSTRUCTION NEWS

Mohrsville, Pa.—The Mohrsville Paper Box Company, manufacturer of paper boxes and containers, has approved plans for new one-story addition, about 40 x 120 feet, for expansion in production division. Erection contracts are being awarded and work is scheduled to begin soon. Cost reported close to $45,000, with equipment.

Newark, N. J.—The J. M. Howard Corporation, 20 North Third street, Philadelphia, Pa., manufacturer of printed paper novelties, has leased space in building at 117-23 Sylvan avenue, Newark, and will occupy at once for branch plant.

St. Marys, Ga.—The St. Marys Kraft Corporation, St. Marys, recently organized as an interest of the Gilman Paper Company, Gilman, Vt., Charles Gilman, vice-president, has begun the awarding of equipment contracts for proposed new mill on tract of about 80 acres of land near Kingsland, Ga., vicinity of St. Marys, recently referred to in these columns. An award for pulp-washing and refining equipment has been let to the Valley Iron Works, Appleton, Wis.; for causticizing machinery, to the Dorr Company, 570 Lexington avenue, New York, N. Y.; for evaporators, to the Goslin-Birmingham Manufacturing Company, 3755 Tenth avenue, North, Birmingham, Ala.; and for power and recovery boilers, and accessories, to Babcock & Wilcox Company, 85 Liberty street, New York. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., will furnish a turbine-generator unit for power plant at the mill, with condenser, switchgear and auxiliary equipment, as well as requirements for general purpose motors for mill service. Plant will comprise several large one and multi-story units, to be used initially for pulp production on basis of about 100 tons of sulphate pulp per day. At a later date it is proposed to establish a paper-making division for the production of kraft wrapping papers, bags, etc. Entire project will cost over $2,500,000, instead of smaller sum previously noted. Erection contract has been let to the Morton C. Tuttle Company, Park Square Building, Boston, Mass., which will begin work soon. Completion is scheduled in the spring of 1941. George F. Hardy, 305 Broadway, New York, is consulting engineer.

Newburgh, N. Y.—The National Gypsum Company, 190 Delaware avenue, Buffalo, N. Y., manufacturer of wall board, insulation board, etc., has concluded arrangements for purchase of the plant and property of the Windsor Paper Mills, Inc., at Newburgh, heretofore used for production of corrugating board and allied specialties, and will take immediate possession. New owner will make improvements in the mill, with installation of considerable new machinery and equipment for the production of a new type of gypsum board paper, to be used in the manufacture of gypsum lath at its five mills in the East. It is expected to have the plant ready for operation at early date. Entire project, including mill purchase, will represent an investment of about $200,000.

Johnsonburg, Pa.—The Castenea Paper Company, manufacturer of book and other paper stocks, has rescinded contracts recently awarded for modernization and improvements in mill, previously referred to in these columns, and project will be held in abeyance until next spring, when it is proposed to ask bids on revised plans. Work has been estimated to cost about $50,000, including equipment. T. K. Hendryx, 165 Interstate parkway, Bradford, Pa., is architect and engineer.

Brooklyn, N. Y.—The Hamilton Carton Company, Inc., recently organized, plans operation of a local plant for the manufacture of folding and other paper boxes and containers. New company is represented by Samuel Tullman, 1441 Broadway, New York, attorney.

Cleveland, Ohio—The River Raisin Paper Company, 2525 East 93rd street, Cleveland, with mill at Monroe, Mich., manufacturer of chip-boards, box boards and allied paper stocks, corrugated boxes and containers, has approved contract with the Boldt-Rapp Company, 2175 Ashland road, Cleveland, for remodeling and improving a one-story building at 10200 Miles avenue, S. E., formerly used as a car barn by the Cleveland Railway Company, Midland Building, secured under lease from that company, as noted recently in these columns. Work will be placed under way at once, and as soon as completed the structure will be equipped for the production of paper boxes and containers, with facilities for large capacity. Modernization of property is estimated to cost about $50,000. James M. Hamilton is local manager for the River Raisin company.

Piermont, N. Y.—Robert Gair Company, Inc., 155 East 44th street, New York, N. Y., manufacturer of corrugated paper boxes and containers, has arranged for the purchase of pier property at its mill at Piermont, operated by its Gair Cartons Division, owned by the Erie Railroad and heretofore used under lease. A consideration of about $100,000 will be paid for the property, which will be developed under company ownership.

Meadville, Pa.—The American Viscose Corporation, Delaware Trust Building, Wilmington, Del., manufacturer of viscose rayon products, has let general contract to the George A. Rutherford Company, 2725 Prospect avenue, Cleveland, Ohio, for expansion and improvements in mill at Meadville, including new laboratory unit. Cost estimated close to $65,000, with equipment. Work will be placed under way at once. The Ballinger Company, 105 South Twelfth street, Philadelphia, Pa., is architect and engineer.

Chicago, Ill.—The Commercial Envelope Company has been incorporated to take over and succeed to company of same name at 508 South Dearborn street, manufacturer of envelopes and other commercial paper products. The incorporators are A. W. Gifford, E. E. Miller and P. R. Schreiber.

Chicago, Ill.—The Dixie-Vortex Company, 421 North Western avenue, manufacturer of paper cups, plates, etc., has secured building permit for proposed addition to plant, and work is being placed under way. New structure will be six-story and basement, 60 x 120 feet, as previously noted in these columns, and will provide for large increase in present ca-

pacity. It is estimated to cost approximately $200,000, with equipment. Erection contract has been let to the J. W. Snyder Company, 307 North Michigan avenue. Niestadt & Love, 343 South Dearborn street, are architects.

New Companies

New York, N. Y.—The Melnick Paper Corporation has been organized with capital of 100 shares of stock, no par value, to deal in paper products of various kinds. New company is represented by Philip Gelfand, 270 Broadway, New York, attorney.

Boston, Mass.—The A. B. Envelope Company, 184 Summer street, has filed notice of organization to deal in commercial envelopes and kindred paper stocks. Max Langson, 431 Seaver street, Dorchester; and Bernard G. Rotbery, 3 Charlotte street, Dorchester, are heads.

New York, N. Y.—The Standard Cellulose Company, Inc., has been chartered with capital of 200 shares of stock, no par value, to deal in cellulose products. New company is represented by Julius Blumberg, Inc., 71 Broadway, New York attorney.

New York, N. Y.—The Schuylerville Wall Paper Company, Inc., has been incorporated with capital of 500 shares of stock, no par value, to deal in wall paper, wrapping papers and kindred stocks. New company is represented by Spiro, Felstiner & Prager, 270 Madison avenue, New York, attorneys.

Improve Carthage Mill

[FROM OUR REGULAR CORRESPONDENT]

CARTHAGE, N. Y., September 30, 1940—Announcement is made by the National Paper Products Company, a branch of the Crown Zellerbach concern, that plans have been authorized for new construction and improvements which will allow increase production besides improving the quality of products manufactured here. It was stated that the work has already been started and should be completed within the next few months. A new bleaching plant is to be constructed adjacent to the present grinder room which will have a capacity to bleach thirty tons of pulp daily. The new addition will be modern in every respect. A new paper machine is also to be installed which will manufacture 81-inch width rolls of tissue besides allowing a capacity of approximately 2,000 tons annually. This machine will produce facial tissue exclusively, permitting the present paper machines to manufacture a greater amount of other paper products. It is to be installed in the former converting plant building adjacent to the present machine room.

The improvements will allow the local plant to manufacture several new grades of tissues, permit greater elasticity in the use of available pulps, increase production and further improve quality of manufacture, according to the company. It was also announced that the working force will be enlarged by about fifteen additional men when the new machine is ready for operation. It was pointed out by the management that every sale and use of products in this vicinity has the beneficial effect of not only helping to maintain the present production and employment levels but also provides that much more opportunity for additional employment locally. The plant here manufactures and converts high grade toilet tissues, towels, facial tissue besides manufacturing jumbo rolls of tissue and towels for shipment to other converting plants.

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Henry J. Berger
EDITOR

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COMING EVENTS IN PAPER INDUSTRY

New England Section. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

Delaware Valley Section. Technical Association of the Pulp and Paper Industry—Second Friday of each month at the Engineers Club, Philadelphia, Pa.

Lake States Section. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

Kalamazoo Valley Section. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

National Safety Council, Paper and Pulp Section. Annual Meeting, Stevens Hotel, Chicago, Ill. October 7-11.

BUSINESS CONTINUES UPWARD

General industrial and trade activity is some 20 per cent above the low point of last year. Business continues to expand and it is likely that a new record may be set this year in general industry and trade as well as in the paper and pulp industry. At this date domestic production of paper for the entire year of 1940 has been estimated by well informed sources at from 14,150,000 tons up to 14,300,000 tons, with the number of idle mills estimated at 13 per cent. These idle mills are largely cylinder board plants, with equipment outmoded to profitably compete with modern mills. This is the smallest number of idle mils estimated by the industry in forty years and is comparable with 1920 when 14 per cent of the nation's paper and board mills were reported idle.

In reviewing the general business situation and outlook it is encouraging to note that the volume of new orders received by manufacturers indicates the present upward expansion is likely to be continued. Latest reports indicate the current level to be over 11 per cent higher than in January, 1939, and about 23 per cent higher than at this time last year. The greatest increases were reported in non-durable goods, such as steel and allied products. The recent gains have been smaller in the non-durable goods industries, including paper, but even here the increase is over 10 per cent.

Paper is an old industry with unique products of great utility, many of which are of recent development and due to notable technological advances. Thus the paper and pulp industry is in large part a new industry in which significant expansion continues. The greatest growth of industrial output during the past ten years has occurred in paper and its products, in aircraft, in rayon and in chemicals. These four industries raised the index of industrial production in 1937 above the 1929 peak and in the former year the average for the entire twelve months was above the 1929 average. The peak last year was above the 1929 peak, but the year as a whole failed to quite equal the 1929 average. Industrial production in the first half of 1940, as measured by the newly adjusted Federal Reserve Board index, was slightly below the average for the first half of 1937, although paper production was far above it. Providing only that present levels of industrial production are maintained during the remainder of this year, the current year as a whole will surpass 1937 and thus set a new record for manufacturing and mining.

The national preparedness program of rearmament has brought the United States the long hoped for "new industry" which many have sought as the means of lifting the country out of the depression, Henry H. Heimann, executive manager of the National Association of Credit Men, declared in the association's latest monthly review of business. "The program of the dictatorships has stimulated a business upturn in our country," Mr. Heimann said, pointing out also that the upturn has the drawback of being mainly on the rearmament activity. "Those of us who were not impressed with the glowing accounts of European recovery a number of years ago, however, pointed out then that the recovery was false since it was based upon military preparation, which in the long run, essential as it is, calls for great sacrifice through work and taxation, and results in a lower standard of living."

In commenting further on living standards, Mr. Heimann said in part: "Let us assume that we attempt to expend the stupendous sum of $10,000,000,000 in the next fiscal year for preparedness. If our national income were to approach $80,000,000,000, it would mean one-eighth of our efforts were being directed toward defense measures. By comparison this is much smaller than the percentage of national effort directed towards armaments in European countries now in the conflict. But likewise by comparison there is a tremendous difference between our standard of living and that enjoyed by the people of Europe. Herein is one of the reasons for the difference between American and European living stands . . . most of our history has found us peacefully occupied, developing our resources and building towards a sound prosperity. While we were thus engaged, Europe has frequently been occupied in strife and turmoil."

In briefly discussing the diversion of production, Mr. Heimann says in part: "A diversion of ten billions of dollars for the production of armaments, necessary as it may be, simply means that less of the goods that contribute to the maintenance or increase of our standard of living will be produced. This is inevitable unless through ingenuity and use of ma-

chinery or longer hours we can step up our production of peace-time goods sufficiently to balance the productive capacity and effort that has been diverted to our preparedness program. It would take an optimist to say that this will be done. There are strong reasons, however, for a belief that we are in a cycle which makes it relatively impossible to effectively fight the legislative (rather than economic) trend of shorter working hours, irrespective of the emergency. Time may change this, but the situation today appears against any reversal of the main trend irrespective of how essential it may be. At most the trend may be checked for emergency purposes."

In pointing out that sacrifices will be necessary, Mr. Heimann said, "We should be realistic enough to see that preparation in defense of our country will mean some sacrifice unless we further encroach upon the reserves stored up for us. It was wise business leadership, industrious labor, and careful agricultural husbandry by the generations that have gone before that built these reserves. If we draw on them too heavily, it may mean we will have fully prepared ourselves to defends a weakened national structure. Incentive to work, the spirit of sacrifice, will have been rather thoroughly liquidated. It is inconsistent to preach the need of sacrifices and at the same time demand the maintenance of so-called 'social gains'. There can be a safe-compromise and there must be It will mean the sacrifice of some gains, at least for the time being, in order to insure maintenance of others and an eventual return of the sound gains which have been surrendered."

Carpenter Paper Co. To Build

[FROM OUR REGULAR CORRESPONDENT]

OKLAHOMA CITY, Okla., September 30, 1940—Construction of a new streamlined building, covering 78,999 square feet, is to begin soon for the Carpenter Paper Company, according to Ralph Mosier, manager of the local house. The new building will be located in the 800 block on West Second street.

The designs, drawn by Sorey, Hill & Sorey, city architects, provide for the housing of the entire Carpenter organization on one floor and basement, which promises to be more convenient and enable the speeding-up of orders and deliveries.

Provisions have been made for air conditioning and installation of the newest type lighting facilities. The exterior of the building, decidedly streamlined, is to be faced with light buff brick and glass brick. Because of its unique arrangement, the proposed Carpenter building is referred to as the "Paper House of Tomorrow." In fact, "it is the most modern warehouse of its kind in the southwest and possibly the United States," says Mr. Mosier.

Among well known trade names in the Carpenter line are:

Hammermill, Strathmore, and Champion water marked fine papers; Rochester blottings, Dixie cups, Seal Right containers, Hooven and Allison twines and cordage, Swank and A. P. W. toilet tissues, American boxes and Peerless typewriter paper.

Production Ratio Report

These statistics are based upon paper production reports to the American Paper and Pulp Association.

COMPARATIVE MONTHLY SUMMARIES[1]

Months	1940	1939	1938	1937	1936	1935	1934
January	90.2%	77.5%	63.9%	90.3%	76.1%	65.8%	.....
February	86.2%	81.7%	68.7%	90.1%	77.9%	70.0%	.....
March	83.9%	84.0%	69.6%	90.3%	76.0%	70.5%	.....
April	86.3%	82.9%	68.3%	92.1%	82.3%	70.0%	.....
May	91.7%	80.2%	69.0%	90.6%	81.6%	69.4%	.....
June	93.8%	79.7%	66.0%	87.3%	80.7%	72.3%	.....
July	87.1%	75.2%	72.0%	81.8%	77.3%	64.9%	.....
August	87.3%	82.9%	77.2%	82.9%	81.5%	70.9%	.....
September	.....	88.7%	76.3%	78.6%	80.5%	71.9%	58.2%
October	.....	96.6%	82.5%	73.5%	87.6%	75.6%	64.7%
November	.....	97.2%	79.6%	61.9%	88.0%	75.3%	61.7%
December	.....	91.1%	74.4%	54.5%	85.9%	71.2%	59.6%
Year Average	.....	84.9%	72.3%	80.6%	81.3%	70.5%	.....
First 38 weeks	87.9%	81.1%	69.9%	87.1%	79.3%	69.3%	.....

COMPARATIVE WEEKLY SUMMARIES[1]

CURRENT WEEKS, 1940		CORRESPONDING WEEKS, 1939	
August 17	86.6%	August 19	82.9%
August 24	86.9%	August 26	83.3%
August 31	85.7%	September 2	85.0%
Sept. 7 (Holiday Week)	70.9%	September 9	74.0%
September 14	84.2%	September 16	91.8%
* September 21	88.5%	September 23	93.4%

The following statistics show the number of mills reporting by ratio groups:

	Number of Mills Reporting—Current Weeks					
Ratio Limits	Aug. 17, 1940	Aug. 24, 1940	Aug. 31, 1940	Sept. 7, 1940	Sept. 14, 1940	Sept. 21, 1940
0% to 50%	56	54	53	82	49	41
51% to 100%	237	240	241	208	234	188
Total Mills Reporting	293	294	294	290	283	229

PAPERBOARD OPERATING RATIOS

Per cents of operation based on "Inch-Hours" reported to the National Paperboard Association.

Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1936	62%	67%	67%	70%	69%	70%	69%
1937	80%	86%	86%	88%	85%	77%	66%
1938	54%	60%	61%	57%	58%	56%	57%
1939	60%	67%	71%	69%	64%	67%	63%
1940	71%	70%	69%	70%	76%	79%	72%

Year	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1936	75%	78%	82%	80%	74%	72%
1937	74%	69%	65%	55%	45%	73%
1938	66%	66%	70%	65%	59%	61%
1939	72%	74%	84%	81%	71%	70%
1940	74%	....	....	....	....	....

Week end. Aug. 17, 1940—73%
Week end. Aug. 24, 1940—74%
Week end. Aug. 31, 1940—74%
Week end. Sept. 7, 1940—60%
Week end. Sept. 14, 1940—76%
Week end. Sept. 21, 1940—74%

[1] Production-capacity ratios are based upon six-day capacity ratings which are adjusted periodically to correspond with the ratings reported by individual companies. Ratios are subject to revision until all reports are received.

* Preliminary figure.

Italy Increases Quota for Pulpwood

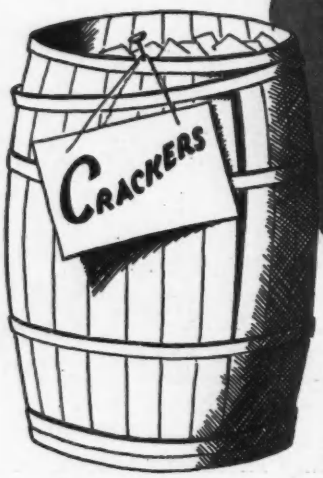
[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., October 2, 1940—It was provided by Italian law No. 797 to increase the quota of rough logs admitted duty-free up to 410,000 metric tons, according to a report from the office of the Commercial Attache, Rome.

Duty-free imports of mechanical and chemical wood pulp has been authorized in Italy for some time in order to provide adequately for the requirements of the national paper and rayon industries. Recently Italy has been utilizing wood for the production of its own pulp and the authorized quota for duty-free wood for the production of pulp was increased from 120,000 metric tons to 180,000. As a result of plant enlargement and increased production possibilities the above mentioned quota has proved insufficient. Hence the new law increasing the amount which may be entered free of duty up to 410,000 metric tons.

"EVERY PAPER PROBLEM IS A FELT PROBLEM"

WHAT'S HAPPENED TO THE CRACKER BARREL



SOMETHING HAS HAPPENED down at the corner grocery store. No longer does the grocer weigh and sell his crackers and a multitude of other products from barrels, boxes, and other bulk containers. Instead, he now carries much of his stock in attractive, individual paperboard containers, which guarantee freshness, purity, and convenience to him and to his customers.

The great increase in the use of paperboard packaging has created new markets for papermakers and also problems to be solved by both the paper and felt industries. High speed production is necessary to keep costs in line, and this calls for open felts. But cartons of this type are usually printed in two or more colors which requires that the felts impart a high finish to the paperboard.

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Section of the
Technical Association of the Pulp and Paper Industry

Edited by Ronald G. Macdonald, Secretary

Recent Advances in the Chemistry of Lignin*

By F. E. Brauns[1]

Abstract

A discussion is given of the recent advances in the chemistry of lignin, thiolignin, and their derivatives.

In the commercial production of pulp from wood and other plant materials these materials are digested at elevated temperatures with either an acid or an alkaline hydrolyzing agent. In both cases the purpose of the cook is the dissolution of the lignin and other noncellulosic materials. The lignin in coniferous woods amounts to about 27 to 28% whereas in deciduous woods it seems to be somewhat lower, varying from 12 to 24% depending upon the method of determination applied. The noncellulosic materials which also go into solution during the pulping process include some pentosans and hemicelluloses and amount to about 20%. These noncellulosic materials are also rendered soluble by a mild acid hydrolysis. With black spruce 18.5% of the wood goes into solution when refluxed for one hour with 1% sulphuric acid or for four hours with 7% oxalic acid. The lignin and the methoxyl content of the hydrolyzed wood increase accordingly, indicating that a noticeable amount of lignin or of the methoxyl-containing material is not removed during the hydrolysis. This, however, does not mean that the lignin has not been changed by this treatment. That it has been partially changed is indicated by the fact that such hydrolyzed wood is not pulped as easily by a sulphite cooking liquor as an untreated wood, as has been shown again recently by Freudenberg. Deciduous woods, such as beech and maple, on the other hand, behave differently. On mild hydrolysis beechwood loses 29% of its weight and maple 27% but in these cases neither the lignin nor the methoxyl content increases accordingly. With beechwood the difference is not as great as with maple. In the first case, the lignin content increases from 20.3 to 27.4%, in the latter from 18 to 22%, whereas the calculated values, if no lignin or lignin-forming material had gone into solution, are 28 and 29%, respectively. The methoxyl content of the hydrolyzed wood, however, increases only from 5.6 to 6.5% in the case of beech and 5.36 to 5.68% in case of maple, whereas if no methoxyl-containing material had gone into solution the methoxyl contents should be 8.0 and 7.35%, respectively. The fact that part of a methoxyl-containing material which appears in a lignin determination as lignin is removed on mild hydrolysis as a water-soluble material can be used as a partial proof for Hilpert's theory, which states that lignin as such does not exist in wood but is a secondary reaction product and is first formed by the action of strong mineral acids on sensitive, partially methylated carbohydrates. That such methylated carbohydrate material is present in sprucewood has been shown by Ritter and Kurth. When the amount of methoxyl attached to the carbohydrate is taken into consideration, the methoxyl content of native lignin as it occurs in sprucewood is calculated to be 14.8%. If the methoxyl in beechwood (5.8%) is entirely attached to the lignin (24.4%), the latter should have a methoxyl content of 27.3%, whereas only 20.7% is actually found. For maplewood the calculated methoxyl content is 26% but only 19.8% is found in isolated maple lignin. One reason for this discrepancy is the fact that standard lignin determination methods are not suitable for deciduous woods as can be seen from the great variations in the lignin contents found for these woods in the literature. Another reason is that a part of the methoxyl content is combined with carbohydrate material. For maple this amount is 1.24%. **Lignin, isolated from beechwood or maple** according to Willstätter and Kalb, is obtained in 22.8 and 19.2% yields, respectively, and a light yellow mother liquor results. When these mother liquors are diluted and heated, almost black precipitates settle out. These precipitates, after purification, have a methoxyl content of 9.45% in the case of beech and 16.6% in the case of maple. They are completely soluble in 5% sodium hydroxide solution, in contrast to their Willstätter lignins, and are reprecipitated quantitatively by mineral acids but not by carbon dioxide. In this respect they behave like humic acids but differ from those prepared from fructose and other ordinary carbohydrates in their methoxyl contents. According to the literature the methoxyl content of natural humic acids is insignificant and it has been generally assumed that the presence of methoxyl groups is a significant difference between lignin and humic substances. The experiments with beech and maplewood, however, clearly indicate that this concept can no longer be maintained. The only difference between lignin and humic substances so far known is the presence of carboxyl groups in the latter.

The formation of methoxyl-containing humic substances also may support Hilpert's concept regarding

* Presented at the Fall Meeting of the Technical Association of the Pulp and Paper Industry, Olympic Hotel, Seattle, Wash., Aug. 20-23, 1940.

[1] Member TAPPI, Research Associate, The Institute of Paper Chemistry, Appleton, Wis.

the occurrence of sensitive methoxyl-containing sugars which form lignin-like products by a secondary reaction. However, there is no doubt that lignin in sprucewood is already preformed as such and is present as an aromatic compound. This has been proved again recently by Freudenberg who succeeded in isolating vanillin directly from sprucewood in a yield of 25% (based on the lignin content). Hitherto it was generally believed that vanillin can be obtained only in small amounts from lignosulphonic acid and it is claimed that the yield of vanillin increases with the increasing degree of sulphonation. Freudenberg has shown that isolated Willstätter and Freudenberg lignins, lignosulphonic acid and, as mentioned before, even sprucewood, give vanillin up to 25% when heated with sodium hydroxide and nitrobenzene under pressure, indicating that the sulphonation of the lignin has no relation to the formation of vanillin and that all theories which are based on this reaction are invalid.

Lignin-Building Unit

The formation of vanillin directly from native lignin also supports the concept first put forward by Freudenberg that spruce lignin contains in its building stone the vanilloyl group. In recent years confusion has penetrated the lignin literature because the term "lignin-building unit" is used with two different meanings. Based on a series of experiments with various lignin derivatives, Hibbert, Brauns, and co-workers proposed an empirical formula for a lignin-building unit with a molecular weight of around 840. This unit is distinguished by the presence of one phenolic and one enolic hydroxyl group. The existence of a lignin-building unit of this size has been further shown by Sarkar, Hägglund, Holmberg, and Freudenberg. Recently, however, Hibbert and co-workers used the same term for a C6-C3 group of a molecular size of about 170, for which Freudenberg had introduced the term "lignin-building stone". In this paper, the term "lignin-building stone" will be used in Freudenberg's sense, for a C6-C3 group, whereas the term "lignin-building unit" will be used in the earlier sense—i.e., for a unit of 5 building stones with a molecular weight of about 840—in the same way as glucose is the building stone of cellulose and starch, whereas cellobiose and maltose are their respective building units.

The fact that lignin gives vanillin in yields up to 25% leads us to the structure of lignin. The attempt to present a constitutional scheme for lignin has occupied lignin chemists for the last decade and, as we will later hear a detailed paper on this subject, I will mention this point only superficially. As early as 1897 Peter Klason, one of the earliest and most famous of lignin chemists, recognized the close relationship between lignin and coniferin, the glucoside of coniferyl alcohol, and an aromatic alcohol with a C6-C3 group. In 1920, he suggested that coniferyl aldehyde may be the basic building stone in lignin. This concept was further extended by Freudenberg who suggested, in 1933, that dihydroxyphenylglycerol and its permutation derivatives form the building stones of lignin. The first experimental proof for the occurrence of a C6-C3 group in lignin was presented in 1931 by Max Phillips who succeeded in isolating a small amount of 3-methoxy-4-hydroxyphenylpropane on distillation of lignin with zinc dust and, more recently, by Harris of the Forest Products Laboratory in Madison who obtained on hydrogenation of lignin hexahydrobenzenepropane derivatives in almost 50% yield. In 1938, Hibbert suggested in his guaiacol theory of lignin formation that lignin is a condensation product of guaiacol with 4-keto-oxypentanal. This is of interest in that, for the first time, a 5-membered side-chain in the aromatic nucleus is suggested. Because of his more recent discoveries, Hibbert and co-workers have now adopted the C6-C3 "building stone" for the basis of lignin formation. It may be mentioned that recently Hachihama has claimed that he obtained, in addition to pyrocatechol, protocatechuic acid and *p*-hydroxybenzoic acid, 3-methoxy-4-hydroxyphenylpropane (dihydroeugenol) in a total yield of 46.7% on pressure hydrogenation of softwood lignin.

Five such C6-C3 building stones form a lignin-building unit of a molecular weight of about 840. The existence of such a lignin-building unit has been proved in several ways and Holmberg in a recent investigation of thioglycolic acid lignin finds that a lignin-building unit of the same size condenses with 4-thioiglycolic acid groups. A further investigation of thiogylcolic acid lignin at the Institute has shown that these thioglycolic acid groups react with lignin in such a way that their carboxyl groups are still free and can be methylated with the formation of methyl esters. These are saponified by alkali with simultaneous splitting off of two thioglycolic acid groups. On further methylation of thioglycolic acid spruce lignin with dimethyl sulphate and sodium hydroxide, another thioglycolic acid group is split off, giving finally a methylated monothioglycolic acid lignin which has one thioglycolic acid group in the lignin-building unit. The manner in which the thioglycolic acid reacts with the lignin molecule is not yet clear. Isolated lignin, such as Willstätter lignin, also reacts with thioglycolic acid, giving a thioglycolic acid Willstätter lignin in which three thioglycolic acid groups have entered the lignin-building unit. That the hydroxyl groups of the lignin are not involved in this condensation reaction is shown by the fact that a fully methylated glycol lignin, in which all the hydroxyl groups are covered, still reacts with three molecules thioglycolic acid just as Willstätter lignin does. In contrast to the derivatives of the latter, however, the condensation product of the fully methylated lignin is now soluble in dilute sodium hydroxide, indicating the presence of free carboxyl groups. A trithioglycolic acid lignin derivative was also obtained by Holmberg from ethanol lignin. The reaction between thioglycolic acid and lignin resembles that of phenol lignin in which four phenol groups react with the lignin-building unit of a molecular weight of 840 with the formation of phenol lignin A. The reaction mechanism of phenol and lignin is also still unknown and the structures so far proposed for lignin do not give any explanation for it. It was hoped that by using thiophenol instead of phenol some light might have been obtained on the reaction between phenol and lignin, as the introduction of the mercaptan group might have facilitated the problem. This failed however. It is true that thiophenol in the presence of a trace of hydrochloric acid dissolves lignin almost quantitatively and gives an almost white pulp, but the reaction product is a mixture of a number of condensation products from which a derivative, having four thiophenol groups per lignin-building unit, has been isolated. Two of these thiophenol groups are more loosely bound and are split off on methylation with dimethyl sulphate and sodium

hydroxide. In the phenol lignin the phenol groups are more firmly combined with the lignin.

A further proof for the existence of a lignin-building unit of a molecular weight of 840 is given by the studies of isolated native lignin—a lignin which has been isolated from sprucewood by extraction with an indifferent solvent at room temperature without the use of an acidic or an alkaline catalyst. Such lignin is obtained in a yield of about 2 to 3% of the wood, or 8 to 10% of the total lignin. It is obtained as a fine, very light cream-colored powder and has a methoxyl content of 14.8%, which agrees exactly with that calculated for spruce lignin on the basis of the methoxyl content and the lignin content of the wood taking into consideration the part of the methoxyl content which, according to Ritter, is attached to carbohydrate material. This isolated native lignin gives all the typical lignin reactions, especially the brilliant purple color with phloroglucinol and hydrochloric acid. Recently it has been claimed that this coloration is not due to the lignin but to the presence of aldehydes, particularly vanillin and coniferyl aldehyde, in sprucewood. It is true that this coloration is not specific for lignin only, as other compounds, such as vanillin, give similar color reactions. It is impossible, however, that the color reaction of native lignin from sprucewood is due to the presence of such impurities, for native lignin is precipitated from its dioxane solution into ether or benzene which are good solvents for impurities of this kind. Another proof that the color reaction is caused by the lignin itself is that, on exhaustive methylation of native lignin with diazomethane in anhydrous dioxane solution, a partially methylated native lignin is obtained which no longer gives the color reaction with phloroglucinol. The same observation is made with sprucewood itself. When sprucewood is methylated with diazomethane it loses its ability to give not only the color reaction with phloroglucinol and hydrochloric acid but also other stain reactions typical for groundwood. This indicates that in both cases the specific group in isolated native lignin and in sprucewood, which is responsible for the color reaction, has reacted with the diazomethane and has lost its reactivity and the question arises as to what kind of groups has reacted with the diazomethane. Diazomethane reacts chiefly in two ways: either as a methylating agent, whereby acidic and enolic and, under certain conditions as in the presence of water, some alcoholic hydroxyl groups are methylated with the liberation of nitrogen and an increase of the methoxyl content by formation of methyl ether or esters; or in such a way that it adds, under certain conditions, to double bonds forming 5-membered nitrogen containing ring compounds of the pyrazole and pyrazolidene type with no formation of methoxyl groups and a decrease of the latter if such are already present, as in the case of native lignin and sprucewood. The reaction products of native lignin and of sprucewood with diazomethane are practically free of nitrogen and show a considerable increase of the methoxyl content. With native lignin this increase amounts to from 14.8 to 21%; the same value is obtained with the lignin in sprucewood. Willstätter and Freudenberg spruce lignin, methylated with diazomethane with exclusion of water, also has a methoxyl content of 21%. On the basis of a molecular weight of 840 for the lignin-building unit, the increase of the methoxyl content from 14.8 to 21% for isolated native lignin corresponds to the introduction of two new methoxyl groups into the lignin-building unit. If, however, isolated native lignin is methylated in ether suspension with an amount of diazomethane calculated for only one methoxyl group, a partially methylated native lignin is obtained with a methoxyl content of 18.3%. Unlike the partially methylated native lignin with 21% methoxyl, the product with 18.3% is completely soluble in dilute sodium hydroxide solution and still gives the strong color reaction with phloroglucinol and hydrochloric acid. This fact is mentioned because it is needed later to explain reactions in the sulphonation of lignin.

Reactions of Native Lignin

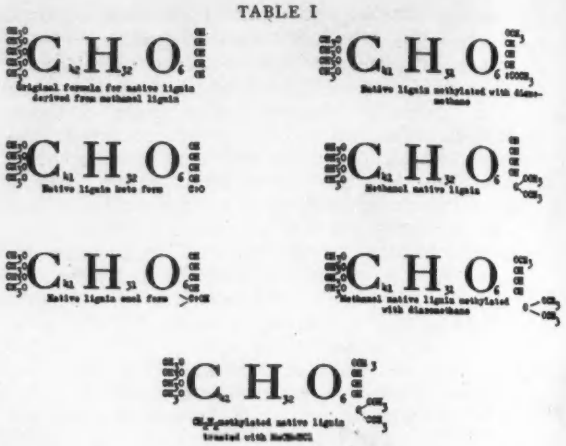
When isolated native lignin is treated with methanol in the presence of 0.5% hydrochloric acid, the methanol immediately condenses with the lignin forming methanol lignin with a methoxyl content of 21%. This methoxyl content corresponds to two new methoxyl groups in the lignin-building unit and is the same as that of methanol lignin prepared by direct extraction of lignin from sprucewood. In spite of the fact that the methoxyl content of the methanol native lignin and that of the diazomethane-methylated native lignin is almost the same and that in both cases two new methoxyl groups are introduced into the lignin-building unit, the products differ not only in their outer appearance—the methanol native lignin being a light grayish brown, the diazomethane-methylated native lignin almost white—but also in their behavior towards 5% sodium hydroxide solution, in which the methanol native lignin is soluble and the diazomethane-methylated native lignin is insoluble. They differ also in their behavior towards 72% sulphuric acid. While the diazomethane-methylated native lignin is recovered unchanged, the methanol native lignin loses its two new methoxyl groups. The fact that methanol native lignin, like the methanol lignin prepared directly from sprucewood, is soluble in sodium hydroxide indicates the presence of an acidic hydroxyl group which should be capable of being methylated with diazomethane and, indeed, on treatment of methanol native lignin with diazomethane, the methoxyl content increases to 24.4%, the same as previously found on methylation of methanol lignin prepared directly from sprucewood. This increase from 21 to 24.4% corresponds to the introduction of one methoxyl group per lignin-building unit. The same product is also obtained when diazomethane-methylated native lignin is treated with methanol and hydrochloric acid. The introduction of one methoxyl group in both cases proves again that the lignin-building unit must have a molecular weight of at least 840, for if it were only a fraction of this number, only a fraction of a methoxyl group would have to be introduced, which is impossible. Further methylation of diazomethane-methylated native lignin and of methanol native lignin leads to two fully methylated native lignin derivatives, the former having a methoxyl content of 30.3%, the latter, 32.3%. The difference of 2% in the methoxyl contents corresponds to one methoxyl group (*see* Fig. 1).

It may be mentioned that isolated native lignin also reacts with phenol, thiophenol, and thioglycolic acid in a way similar to the lignin in the wood itself.

The question now arises as to how these various reactions of native lignin can be explained. As the

result of an extensive investigation of a series of spruce lignin derivatives and their elementary analysis, formula 1 (Table I) was proposed for the lignin-building unit. This formula was derived from methanol spruce lignin on the assumption that, on treatment of spruce lignin with methanol hydrochloric acid, only one new methoxyl group enters the lignin-building unit. It was also based on the statement in the literature that the methoxyl content of sprucewood is 17.3%. The study of native lignin has shown that both the assumption and the literature are wrong. The methoxyl content of spruce lignin is 14.8% and not one but two methoxyl groups are introduced into the lignin building unit. Although in our earlier work a lignin-building unit with five methoxyl groups was arrived at, this number must now be changed to four. Since it has been known for a long time that the number of hydroxyl groups and methoxyl groups in spruce lignin is the same, the number of hydroxyl groups had to be reduced to four also. The fact that, on treatment of native lignin with methanol hydrochloric acid, two methoxyl groups are introduced which, on treatment with 72% sulphuric acid, are split off again indicates the possibility of the presence of a carbonyl group in the lignin-building unit. While the presence of such a group had been suggested by various workers, its existence was not definitely proved. The fact that native lignin reacts with phenylhydrazine giving a hydrazone with 13.3% methoxyl supports the idea. The original formula for the lignin-building unit therefore has to be changed in such a way that the hydroxyl group resulting from the fifth methoxyl group and the fifth hydroxyl group of the old formula are in fact one carbonyl group. This carbonyl group is easily enolizable. Native lignin therefore can react in two different forms, namely, in its keto form (formula 2) or its enol form (formula 3). The lignin-building unit of native lignin has then four methoxyl groups and four hydroxyl groups, one of which is phenolic, and one easily enolizable carbonyl group. This formula explains the behavior of native lignin in the various methylation reactions. In its solid state the phenolic hydroxyl group is methylated giving a partially methylated native lignin with 18.3% methoxyl. The free carbonyl group is still capable of giving the phloroglucinol hydrochloric acid color reaction and on enolization the product is still soluble in sodium hydroxide solution. In dioxane solution the keto form is enolized and the enolic hydroxyl group is methylated, giving a partially methylated native lignin with a methoxyl content of 21.4%. The carbonyl group has disappeared, the product no longer gives the phloroglucinol color reaction and is now insoluble in sodium hydroxide solution. Methylation with methanol hydrochloric acid gives the methanol native lignin with two methoxyl groups attached to the carbonyl group. Both the diazomethane-methylated native lignin (formula 4) and the methanol native lignin (formula 5) have six methoxyl groups but, as can be seen, differently combined. In the former case 72% sulphuric acid has no effect; in the latter case the acetal-like methoxyl groups are split off again. In the methanol native lignin the phenolic hydroxyl group is still free. On methylation with diazomethane the phenolic hydroxyl group is methylated (formula 6) and the methoxyl content increased to 24.5%. As previously mentioned, diazomethane-methylated native lignin, on treatment with methanol and hydrochloric acid, gives a similar compound with the same methoxyl content (formula 7) but it cannot be decided at present whether the new methoxyl group is attached to the carbonyl group or to an adjacent carbon atom.

TABLE I



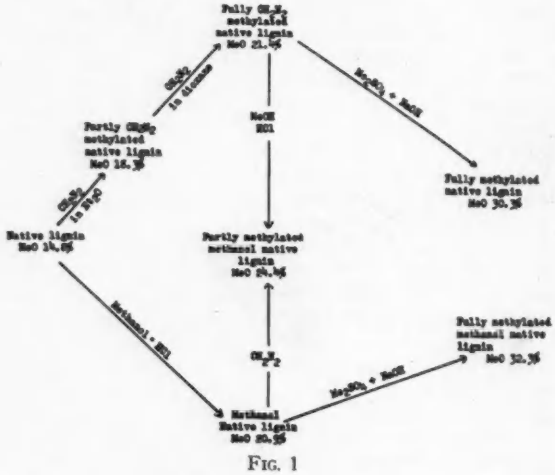


FIG. 1

Isolated native lignin is completely soluble in sulphite cooking liquor and the lignosulphonic acid so obtained is now under investigation; it is hoped that more light will be obtained as to the actual reaction taking place between the lignin and the bisulphite. A number of theories have already been offered but they are without experimental proof. It is generally believed that sulphonation of lignin does not occur at temperatures below 100 deg. C. This is not true. An investigation carried out several years ago with Mr. McLaurin showed that lignin as it occurs in sprucewood reacts at room temperature with aqueous sulphurous acid and forms what may be called a solid lignosulphonic acid. Such a treated sprucewood which was used as a colloidal suspension in order to increase its reactivity has a final sulphur content of about 1.2%, corresponding to about 3.5% based on the lignin in the wood. This sulphur content corresponds to one sulphonic acid group per lignin unit of a molecular weight of 840. A lignosulphonic acid prepared under mild cooking conditions also has a sulphur content of above 3.5%; this seems to be the minimum sulphur content necessary in order

to render the lignin soluble. The reason the lignin does not go into solution when sprucewood is treated at room temperature, in spite of the fact that it is sulphonated to 3.5%, may be due to one of two causes: either the lignin is chemically combined with some carbohydrate material from which it has first to be split off by hydrolysis which takes place at a more rapid rate only at higher temperatures; or the lignin is combined with sulphurous acid by simple addition, forming the so-called solid lignosulphonic acid, and this addition compound, at higher temperatures, rearranges with the formation of the soluble lignosulphonic acid. It is also possible, of course, that all three reactions—i.e., addition, hydrolysis and rearrangement—take place. Lignosulphonic acid, in addition to the sulphonic group, has a free phenolic hydroxyl group and for a long time the question was discussed whether this free hydroxyl group is present in native lignin or whether it is first formed during the sulphonation. If the phenolic hydroxyl group is already present in the native lignin, a lignosulphonic acid prepared from a wood meal in which this hydroxyl group is methylated should have one more methoxyl group than that obtained from an unmethylated wood. Sprucewood meal, methylated to such an extent that the methoxyl content of its lignin is 21.5%, is subjected to a sulphite cook using ordinary cooking conditions. The result is surprising. The wood meal is recovered in a yield of about 80%. Its lignin content has increased from 27 to 35%, wheras the methoxyl content of the lignin has not changed. The loss of about 20% is the same as when sprucewood is subjected to a mild hydrolysis as mentioned before and the increase of the lignin corresponds to the loss in weight due to the hydrolysis of pentosans and hemicelluloses. A second cook with the same wood meal has no further effect. An analysis shows that the lignin is sulphonated but it does not dissolve. This has been confirmed by Hägglund. About the time this work was concluded,

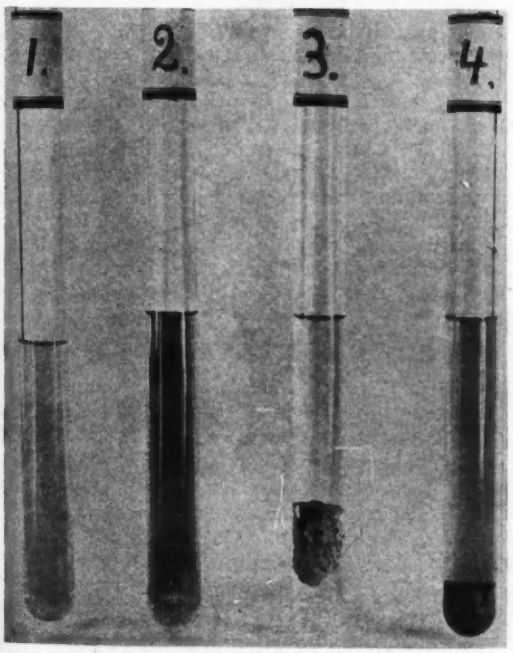
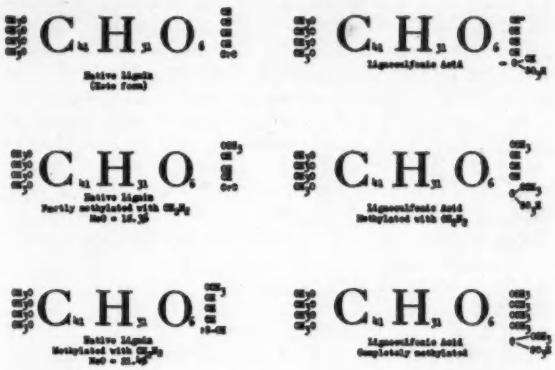


FIG. 2

TABLE II



Freudenberg published a paper in which he stated that a sprucewood in which the lignin had been methylated to a degree of 18 to 19% methoxyl can still be pulped. How can this discrepancy be explained? The following experiments give the solution. As already mentioned, isolated native lignin is soluble in sulphite cooking liquor. However, when the isolated native lignin is methylated to 21.4% and then subjected to a sulphite cook under exactly the same conditions as used in the experiment with the isolated native lignin, the methylated product is completely unchanged and the cooking liquor remains colorless. This confirms the finding that a sprucewood in which the lignin is methylated to a methoxyl content of 21% can no longer be pulped. The lignin in Freudenberg's methylated sprucewood was methylated only to the extent of 18 or 19%. Unfortunately, no exact methoxyl content is given. If we take 18.5% as an average, and since, as mentioned above, methylation of isolated native lignin in suspension gives a partly methylated native lignin with a methoxyl content of 18.3%, it seems that this is the key to the solution of the discrepancy. In both wood meals the phenolic hydroxyl group of the lignin is methylated and in the wood meal with the lignin having a methoxyl content of 21.4%, the hydroxyl group of the enolized carbonyl group is also methylated which prevents the dissolution of the lignin. In other words, the free carbonyl group is essential for the dissolution of lignin in sulphite cooking liquor. As already mentioned, the lignin in the methylated sprucewood is partially sulphonated after the cook and so is the diazomethane-methylated isolated native lignin. An experiment on cooking the isolated native lignin methylated to a methoxyl content of 18.3% only is in progress. This lignin should be soluble and yield a lignosulphonic acid with a methoxyl content of about 16.5% and should no longer have a free phenolic hydroxyl group. The question now arises as to how the formula for the lignin-building unit fits into the reaction mechanism between lignin and sulphite cooking liquor. Table II, formula 1, represents the lignin-building unit in its keto form. This reacts with sulphite liquor to form lignosulphonic acid. It is questionable whether the sulphonic acid group remains at the carbonyl group or, as is more probable, whether the sulphonic group is rearranged since a sulphonic group at the carbonyl group is easily split off again. In an investigation of lignosulphonic acid six years ago with Mr. King, it was found that, when a carefully prepared lignosulphonic acid in the form of its sodium salt is methylated with diazomethane, the methoxyl content in-

creases to 19.4%; for six methoxyl groups per lignin-building unit, as shown in formula 4, 19.2% is calculated. When the free acid of the premethylated lignosulphonic acid is further methylated with diazomethane giving seven methoxyl groups, the sulphonic acid group is esterified and the methoxyl content increases to 22% for which the calculated value is 22.1%. Complete methylation of lignosulphonic acid with dimethylsulphate and sodium hydroxide gives a methylated lignosulphonic acid with a methoxyl content of 27.7%, a value also found by Freudenberg; for a compound with nine methoxyl groups, 27.6% is the calculated value. It can be seen that this earlier work is in good agreement with the formula for a lignin-building unit of native lignin with a molecular weight of 840. Figure 2 shows the results of four bomb tube experiments. In all experiments, 0.5 gram lignin and 25 cc. cooking liquor were used. Experiments 1 and 2 were carried out with isolated native lignin, 3 with diazomethane-methylated isolated native lignin with a methoxyl content of 21.4%, and 4 with methanol native lignin with a methoxyl content of 21%. It can be seen that in 1 and 2 the lignin is completely dissolved; in 3 nothing has gone into solution, the product simply softens and on cooling it solidifies again. With methanol native lignin (4) a part has been dissolved as can be seen from the dark color of the supernatant solution. Since, however, the hydrolysis of the acetal methoxyl groups is very slow, the cook takes much longer. This experiment is under further investigation.

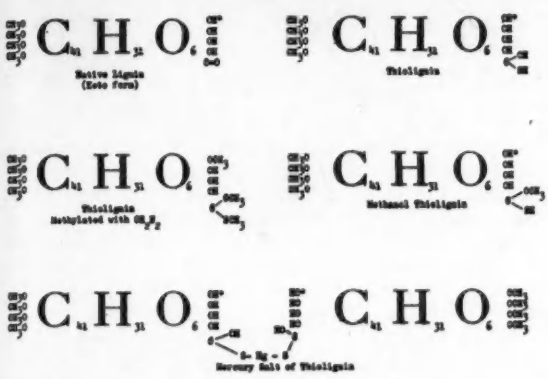
Lignin-Sodium Hydroxide Reaction

Whereas in the sulphite cooking process the carbonyl group plays an essential part, the reaction taking place in the soda and sulphate cook is still unknown. The study of the sulphite cooking process is facilitated because in this reaction a new element, namely sulphur, is introduced into the lignin molecule. In the reaction between sodium hydroxide and lignin, as used in the soda cook, it is difficult to decide whether the alkali has reacted with the lignin, and if so, in what way. Isolated native lignin is soluble in cold dilute sodium hydroxide and a study of the effect of sodium hydroxide on this lignin at higher temperatures is in progress. In order to dissolve isolated native lignin, 40 grams sodium hydroxide are needed per lignin-building unit, i.e., 840 grams. If this ratio held for the dissolution of lignin in sprucewood with a lignin content of 30%, only 1.45 kg. of sodium hydroxide would be needed for 100 kg. of sprucewood. Practice, however, has shown that at least 16 to 18% soda is consumed. A preliminary investigation with Mr. Grimes has shown that the larger part of the sodium hydroxide is consumed by the carbohydrates which are dissolved first, followed by a mixture of lignin and carbohydrates, while in the last stage almost nothing but lignin is dissolved. When Willstätter spruce lignin, which is insoluble in cold sodium hydroxide solution, is subjected to a soda cook under conditions similar to those applied in the soda process, it is completely dissolved and is precipitated again by acidification and even by carbon dioxide. Unlike the original Willstätter lignin, the alkali Willstätter lignin is again soluble in dilute sodium hydroxide solution and also in dioxane. The methoxyl content is not much changed, indicating that no methoxyl groups have been split off. In the literature, the theory has been advanced that oxygen-containing rings, such as those in coumaran with a furan ring and in flavan with a pyran ring, are present in lignin and are opened by the alkali with the formation of a new phenolic and a new alcoholic hydroxyl group. If this theory is correct, a completely methylated Willstätter lignin also should go into solution, because the methylation of the hydroxyl groups in the lignin should have no effect on the reaction with sodium hydroxide and for each opened ring the resulting product should have two new hydroxyl groups which should be easily detected. When a methylated Willstätter spruce lignin with a methoxyl content of 32% is heated with sodium hydroxide solution under the same conditions as used in the soda process, the product is recovered unchanged, the solution being almost colorless. In other words, a fully methylated Willstätter lignin is not attacked at all by the sodium hydroxide solution. In this connection, the question arises as to whether the unchanged lignin in wood, after methylation with dimethyl sulphate and sodium hydroxide, would behave in the same manner as methylated Willstätter lignin, or whether the lignin would be dissolved in spite of the covered hydroxyl groups. It is probable that either Willstätter lignin may be changed during the isolation process and therefore behave differently from native lignin, or that the native lignin is combined chemically with other constituents of the wood in such a way that this chemical linkage is broken by an alkaline hydrolysis with the liberation of a phenolic or enolic hydroxyl group, thus rendering the lignin soluble. When a methylated sprucewood with a methoxyl content of 35%, the lignin of which has been methylated to 27.5% corresponding to eight methoxyl groups in the lignin-building unit, is subjected to a soda cook, the lignin goes completely into solution. This experiment is still in progress and no details can be given in regard to the lignin. For the time being, the fact is of interest that in the case of methylated sprucewood the lignin still dissolves in alkali.

Lignin Reaction in the Sulphate Process

In spite of the fact that sodium sulphide is used in the sulphate pulp industry to a large extent, the actual reaction taking place in this process is still unknown and the lignin from such a cook has scarcely been investigated. As sodium sulphide is an alkaline medium, it should react in a way similar to sodium hydroxide and, if an interaction between the lignin and the sodium sulphide takes place, a lignin derivative containing sulphur may result and this may help to clear up the reaction. When Willstätter lignin is cooked with a 10% sodium sulphide solution for one hour at 170 deg. C., it goes completely into solution, from which it is quantitatively precipitated by mineral acids. The purified product has a methoxyl content of 14.4% and sulphur content of 3.7%. This corresponds to four methoxyl groups and one sulphur atom per lignin-building unit. When sprucewood is cooked with sodium sulphide, the lignin precipitated and purified, a thiolignin is obtained. This thiolignin has been investigated by Mr. Ahlm who found that it has a methoxyl content of 14.4%, the same as that obtained from Willstätter lignin. When the thiolignin is methylated with diazomethane, three new methoxyl groups are formed, whereas on methylation with methanol and hydrochloric acid, only one methoxyl group is introduced. The sulphur content of the thiolignin is 3.2%, which is about 0.5% lower than the

TABLE III



sulphur content of the thio derivative from the Willstätter lignin which had been cooked with a 10% sulphide solution. The lower sulphur content in the thiolignin is caused by the presence of some alkali lignin. The latter is produced by the action of the sodium hydroxide in the cooking liquor which is formed by the hydrolysis of the sodium hydrogen sulphide in the aqueous solution. This alkali lignin can be separated from the thiolignin by the formation of the mercuric salt of the latter. When this is done, the sulphur content of the thiolignin increases to 3.7%. The fact that thiolignin forms a mercuric salt indicates the presence of a mercapto group in thiolignin. On the basis of the experimental and analytical results, Mr. Ahlm offers the following empirical formula for thiolignin (Table III). Formula 1 is again the formula for native lignin in its keto form. According to Ahlm, the carbonyl group reacts with sodium hydrosulphide with the formation of a mercapto group as shown in formula 2. Formula 3 shows the thiolignin methylated with diazomethane, formula 4 the thiolignin after treating it with methanol-hydrochloric acid. Formula 5 shows the mercury salt. Time does not permit of a more detailed discussion of the theory of the sulphate cooking process but the following conclusions may be drawn from Mr. Ahlm's results. The presence of three groups capable of forming sodium salts—namely the mercapto group, a phenolic and an enolic hydroxyl group per lignin-building unit—may facilitate the dissolution of the lignin. The sulphide in the cooking liquor is necessary for the formation of the mercapto group in the lignin-building unit, while the sodium hydroxide is necessary for the formation of the sodium salt with the phenolic and enolic hydroxyl groups. The optimum ratio of sodium hydroxide to sodium hydrosulphide, according to this formula, would be 2:1 which is what is actually found in the industry. It is obvious that changes in the composition of the wood—i.e., in the content of sugars, tannins, pentosans, and hemicelluloses which, as already pointed out, are partly dissolved with the consumption of alkali before the lignin is attacked—necessitate changes in the composition of the sulphate liquor in order to obtain a pulp with the most favorable properties.

I think we all agree with a statement recently made in a letter to me by Freudenberg, that "the lignin problem is far from being solved." The most important contribution to the solution of its structure made in recent years is the work by Harris who found that, on hydrogenation of lignin, 70% of it is composed of C6-C3 building stones. The question, however, as to how these stones are linked together to form the lignin-building unit is still unanswered. This question will not be solved by theories based on assumptions but only by experimentally proved facts. The sensitiveness of lignin towards oxidation and other reagents makes the solution difficult. Lignin is a jig-saw puzzle in which the results of various experiments are the pieces which have to be fitted together to give us finally the picture of lignin. In order to obtain this picture as completely as possible many results of various kinds of experiments must be collected. By fitting together the pieces so far obtained, it is possible to detect the shape of one or another piece still missing and to carry out experiments in the right direction to find it. When finally the whole picture is finished, it may help the pulp and the forest products industry to find a more valuable use for lignin similar to the intense investigation of coal tar which has led to the foundation of the coal tar-dyestuff industry with its valuable products.

A Symposium on Spectrophotometry in the Pulp and Paper Industries

Introduction to Color Measurement of Uncoated Paper

(Continued from the issue of Sept. 26, 1940)

PAPERMAKER: Did you say Mr. Griesheimer is a physicist? Why he talks my language—part of the time anyway! He's seen us color men "fight a color" until we whip it,—though once in a while it does "whip" us.

METER: Could you take over Mr. Griesheimer's method just as it is?

PAPERMAKER: I'm not sure whether we could or not. I probably don't understand the methods well enough yet to judge; we will have to work it out together. Mr. Griesheimer talked about the use of instruments in two types of mill, a high production mill like Mead, and a specialty mill, like Munising. My mill is neither one or the other; but is something like both. I don't know why it is, but my own problems seem to be more complicated than anyone else's.

METER: I suppose that is only natural.

PAPERMAKER: Now take the high production mills. There you have some paper machines that run day-in and day-out making the same paper. In the newsprint mill, it may be 100 tons today, 100 tons tomorrow, 100 tons every day in the year for the *New York Times* or the *"Oshkosh Astonisher."* Same paper,

same color within very narrow limits, year after year. And in the book-paper mill it's about the same; 50 tons every day for the *Saturday Evening Post* or *Colliers*, or *Life*, and so forth. The pulpmakers, machinery men, the laboratories, all work together with the papermaker so that nothing changes,—barring flood or war.

METER: Surely the laboratories of those mills use some kind of spectrophotometer.

PAPERMAKER: Yes, most of them have instruments of one kind or another for color control. That's just the point I was making. If I had a high-production mill I would be sold on instruments, too. When a question of policy comes up in a high-production mill, —a change to a new color, a new pulp, the adjustments have to be very thorough. No chances are taken. The new paper must stand up just as well for the customer, and it must run just as easily, or more easily, over the machine. These high-production units would certainly catch your fancy, Mr. Meter; they *meter* the pulp, meter the dye, meter everything. Automatically as the speed of production steps up or slows down for any reason these pulp and dye meters speed up or slow down in synchronism with the main drive of the machine.

METER: I'd like to go through a mill like that.

PAPERMAKER: Well, maybe we can arrange it. But even Mr. Griesheimer wasn't talking about quite that degree of specialization. Mead makes blue and white and perhaps a couple of other colors every week or two; and one or several of a dozen other standard colors along with them. Mr. Griesheimer is part of an organization to adjust the machines to an intricate schedule decided on from day to day. Each of these standard colors is a fairly simple unit. Adjustments have to be made for the three or four varieties of paper and a half-dozen different weights in each standard color, but some of the adjustments are minor.

METER: You seem to know a lot about your competitor's business, Mr. Papermaker.

PAPERMAKER: I can't afford not to. But we don't compete directly with either Mead or Munising.

METER: Why not; you are all making and selling paper, aren't you?

PAPERMAKER: Yes, but we don't deal in such large quantities as Mead; and we don't go in for specialties like Munising. Our mill is intermediate between Munising and Mead, but we sell to different firms than they do. I hope that you and I can spend a couple of days in each of their mills before we work out our instrument program. And I'd like to take you around to see Dr. Davis' laboratory at Kimberly-Clark.

METER: Is that the Dr. Davis who was the first physicist to enter the paper industry?

PAPERMAKER: None other. Yes, he developed the opacimeter now marketed by Bausch and Lomb, and he was one of the collaborators on the "brightness tester." Ask him sometime how that was developed by two physicists locked up in a Chicago hotel until they finished. I invited Dr. Davis to come down today to tell us about white papers manufactured on a grand scale. And the grander the scale, the grander the instruments and mathematics, that's why I particularly asked him to come down to talk to you, Mr. Meter.

METER: I'll certainly be glad to meet him.

PAPERMAKER: I knew you would, but I have some bad news. Dr. Davis has just telegraphed that he can't get here today.

METER: That certainly is bad news.

PAPERMAKER: Yes, I'm sorry he couldn't make it. However, F. A. Steele, C. K. Williams Company, has agreed to present Dr. Davis' paper on Spectrophotometers and Colorimeters in the Manufacture of Uncoated Papers. Dr. Steele:

Use of Color Measuring Instruments in the Manufacture of Uncoated Paper

By Myrl N. Davis[1]

Abstract

This discussion is limited to the use of spectrophotometers and colorimeters in the design and control of "white", uncoated papers. Experience has shown that a working estimate of the apparent "whiteness" of paper can be obtained by measurement of reflectance with light of 458 mmu wavelength. Instrumentation is available and widely used for making such single measurements on paper samples in controlling the uniformity of paper being manufactured. Hue of the paper is still controlled visually in all but a few paper mills.

It is possible, by use of the Guerivic, Kubelka-Munk, and Smith theories of the optical properties of diffusely reflecting materials, to determine scattering and absorption coefficients for the pulp and pigment, of which paper is manufactured, and by use of these coefficients to predict the reflectance and opacity of papers made from any proportions of these raw materials. Examples are given of such predictions for machine-made papers, the optical coefficients having been obtained from simple hand-made papers.

The effect of supercalendering on opacity and color is discussed. Exact quantitative estimates of the effect of supercalendering is not yet possible.

Before proceeding with discussion of the subject matter of this paper it will be necessary to clarify certain terms which will be used frequently, particularly as one of the terms is almost incessantly used with a meaning somewhat different from that common to colorimetric usage.

In physical photometry it is customary to designate the color of a diffusely reflecting material by a set of three values, dominant wavelength, purity, and brightness. *Dominant wavelength* is a measure of the hue of the sample. *Purity* is a measure of the percentage deviation of the sample from a neutral gray. A purity value of 100 per cent would indicate

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that only light having the dominant wavelength was being reflected. *Brightness* gives the reflectance of the neutral gray material which would appear to a standard observer to have a reflectance equal to that of the sample.

The papermaker who confines his attention only to the so-called "white" papers soon finds his estimate of any sample in a group reduced to the relative "brightness" and the shade or cast of the sample. In neither case do these terms correspond to those used by experts in color theory nor do they agree with the terms used by papermakers interested primarily in colored papers.

The term "brightness" as used in connection with white papers is found to represent a peculiar psychological combination of the physically defined qualities of purity and brightness. In the comparison of two samples purity dominates if differences in physical brightness be small. Brightness dominates if differences in physical brightness be large.

The terms cast (as in "reddish cast") or shade (as in "blue-shade white") are psychological equivalents to dominant wavelength but with one easily discovered difference. If a large group of samples of "white" papers of varying origin be assembled it is immediately noticed that a wide range of hues exists. The colors range from yellowish to a bluish white. Photometric analysis almost invariably shows, however, that the supposed blue-white samples are still really yellowish or at most, neutral in color. Seldom is a "white" paper dyed to such an extent that the dominant wavelength is below 500 mμ. The impression of blueness is induced by contrast with the more yellowish samples.

Whenever attempts are made to introduce photometric methods into the evaluation of the color of white papers, resistance has arisen as soon as the papermaker has discovered that he is being given results in terms of 3 numbers. As nearly as he can see only a single important difference, brightness, exists. He readily notes that two papers which appeared to him to be almost identical have different color specifications. On making this discovery he demands a 1-number color specification which will check his visual evaluation of comparative brightness.

A limited number of spectrophotometers are at present in use in the paper industry. Most of these are of the recording type designed by A. C. Hardy. The spectrophotometers involving optical photometry which have been tried have not been used much because of limited precision and the time consumed in testing any given sample. The fact that so few of the recording instruments are in use is attributable to the cost and the lack of trained technicians to supervise its operation and the availability at much lower cost of a fairly satisfactory instrument yielding the desired 1-number brightness estimate.

Color comparators, designed to estimate color differences between two samples, usually in terms of differences in reflectance to light passed by red, green, and blue filters, have had a limited trial. Lack of stability of standard samples of paper and failure to provide the desired one-figure estimate of color differences explain the low popularity of this type of instrument.

Trichromatic filter photometers have probably had the most frequent trials and almost equally frequent failures of any of the types of instruments so far discussed. Trials of such instruments in which the photoelectric cell has been used as the detector of light have been most common. Failure of the instrument to reproduce its own readings over an extended period of time, together with the demand for a one-number color specification, has usually limited the use of such instruments to short trials. Experimentation with filter photometers has led, in at least two paper mill laboratories, to the discovery that the much desired 1-number specification of the brightness of white papers is approximated surprisingly well, although not perfectly, by the reflectance of the paper to blue light. This discovery, in turn, has led to the development of that instrument now in fairly general use for color measurements on white papers.

Quantitatively, the brightness of a sample of white paper is now defined as the reflectance of a thick pad of the sample in question as measured on the General Electric reflection meter using filter no. 1 (effective wavelength 458 mμ). The brightness of a large group of samples arranged in ascending order fall in essentially the same order as do the samples if arranged in order of increasing brightness by the average of a large group of men experienced in grading white papers. The success of this measurement must be due in part to the relatively small deviation from neutrality of the colors involved, in part to the similarity in shape of the reflectance curves and in part to the fact that the dyes chosen for use in tinting white papers invariably fail to affect appreciably the reflectance to light of wavelengths near 458 mμ.

Discrepancies between the photometric measurements of brightness and subjective evaluation are sometimes found. They are frequently discovered when untinted groundwood papers are compared with "free" sheets. An advantage of about two points in reflectance may be offset by the lack of purity of the reflected light. Suitable use of dyes will tint such a paper to a color which yields identical subjective and instrumental grading.

Theoretical reasoning aside, the measurement just defined on an instrumental basis has become widely accepted in the white paper industry and the term brightness when used quantitatively in that industry means percentage reflectance as thus measured, or as measured at wavelength 458 mμ on the General Electric recording spectrophotometer. The General Electric reflection meter and certain other similar instruments are usually called "brightness testers" in the pulp and paper industries.

A number of factors aside from the one-number measurement have cooperated to make the G. E. brightness tester a reasonably satisfactory photometer for use in testing white papers. They are:

(1) A peculiar economic situation led to the simultaneous distribution of an initial group of some twenty instruments, the number having more than tripled since that time.

(2) Careful standardization of all instruments at The Institute of Paper Chemistry before distribution insures that differences between instruments are reduced to a minimum.

(3) Adoption of a program of monthly "tickler" checks on all instruments by which working reflectance standards and calibrated paper tabs are sent out to each owner of an instrument and results of tests on calibrated papers reported back. Thus correct adjustment of each instrument is insured.

As a result of this procedure the entire group of instruments now in use is held in calibration as a unit, all instruments checking at any time within 0.5 brightness units and most of them within 0.3 units.

Responsibility for maintaining the constancy of

the reflectance scale rests solely on The Institute of Paper Chemistry, where an elaborate system has been set up to insure that slow drifts of the scale be avoided.

Use of Color Measuring Instruments

The normal use of the brightness tester or other color measuring instrument in paper mills is in the control of the uniformity of the papers being manufactured. In such use, the brightness tester, in particular, gives data determining whether the paper being manufactured is within or outside designated tolerances. No attempt is made to prescribe to the beaterman the furnish changes he must make if the paper is above or below standard brightness.

When a recording spectrophotometer is used it is frequently obvious from the character of the reflectance curve of a sample, supplemented by experience, just what changes in furnish or dye are required. In actual practice this advantage of the spectrophotometer is only occasionally important.

Beater Furnish

In the study of proposed changes in furnish for the improvement of brightness or opacity of a grade of paper, the use of a color measuring instrument can be invaluable. A technique for use in such studies which has met with considerable success is as follows: (1) A series of handsheets is prepared using the existing standard pulp furnish and with varying filler furnish so that the desired filler content will certainly fall between two sheets in the set. (2) A similar set of handsheets for each proposed modification of furnish is prepared. (3) The brightness and filler content of each sheet is determined. (4) A plot of the brightness against filler content for each set of sheets is made and the brightness difference between the two sets at the desired filler content values is read off the graph.

In preparing such handsheets care must be taken to use clean water, distilled water being preferable. Air drying of the sheets is preferable to use of the hot plate. If the latter is used, similar drying treatment must be accorded all sheets.

The above technique is laborious but reliable. It will not, in general, yield brightness values identical with those obtained on the paper machine, but the brightness differences will usually check very well with observations on machine made papers of similar furnish difference.

It will be obvious that each proposed furnish modification requires that at least one, and usually two sets of sheets be made and analyzed. The addition of two more measurements — (1) the reflectance of a single sheet, and (2) the basis weight of the sheet — enables one by calculation to compile data which, when sufficiently complete, changes the task of estimating the effect on brightness of any proposed furnish change from a long task in the laboratory to a short piece of desk work.

Diffuse Reflectance

The theory connecting the diffuse reflectance of a material with its thickness evolved by Guerivic *(1)*, Kubelka and Munk *(2)*, and Smith *(3)* led to the definition of two coefficients, S, the specific scattering coefficient and K, the specific absorption coefficient. These coefficients are peculiar to the material or combination of materials for which they are determined.

The reflectance R of a thick layer of a material to which the values S and K apply may be given by:

$$R = B - \sqrt{B^2 - 1}$$

where $B = 1 + \frac{K}{S}$

A material for which the values of K and S are very small may have a thick layer reflectance R equal to that of a material for which K and S are both very large.

Physically the meanings of K and S are as follows:

K is the limiting value of the absorption of light energy per unit thickness as the thickness of the layer of material becomes very small; and

S is the limiting value of the light energy per unit thickness scattered backwards from the sheet as the thickness becomes very small. Thus if one were to plot values of light absorption and diffuse reflectance against the thickness of the sheet, K and S would be the slopes at the origin of the absorption and reflectance curves, respectively.

The thickness of a sheet of paper is a rather indefinite quantity. Since the thickness of the sample was initially chosen as a measure of the amount of material present per unit area, it is logical in the case of paper to use basis weight rather than thickness in the equations. This procedure is successful in practice and will be used throughout the remainder of this discussion.

Mixtures of Diffusely Reflecting Materials

A study of the physics involved in the reflection, absorption, and transmission of diffuse light leads to the conclusion that S should be proportional to the total surface area per unit mass of the particles of material, inversely proportional to the density of the material and should increase with the refractive index. Similarly, K should be proportional to the average length of path traversed by a light ray in passing through a crystal of the material, inversely proportional to the density and should be a rapid function of refractive index.

The foregoing paragraph leads one to the conclusion that if K_1 and K_2 represent the specific absorption coefficients of two materials, then when A parts by weight of material 1 and B parts by weight of material 2 are mixed as a simple physical mixture, the values K_{12} and S_{12} of the specific absorption and transmission coefficients for the mixture should be a weighted mean of the individual coefficients; i.e.,

$$K_{12} = \frac{AK_1 + BK_2}{A + B}, \quad S_{12} = \frac{AS_1 + BS_2}{A + B}$$

Thus we should have:

$$\frac{K_{12}}{S_{12}} = \frac{AK_1 + BK_2}{AS_1 + BS_2}$$

as the quantity determining the thick layer reflectance R of the mixture of materials.

If the foregoing reasoning be correct, it follows that a knowledge of the value of the ratios K_1/S_1 and K_2/S_2 is not sufficient for prediction of the value of K_{12}/S_{12}. The four coefficients K_1, K_2, S_1, S_2 must all be known. Thus the thick pad reflectances R_1 and R_2 of the two materials are not sufficient for precise prediction of the thick pad reflectance R_{12} of the mixture.

The determination of R and S for such a material as paper pulp and for a given wavelength of light may be carried out by the handsheet technique already described if two items of additional informa-

tion are secured. These are the reflectance r and the basis weight W of each single sheet. From this data and the theoretical relationships:

$$r = R\,\frac{1 - e^{\frac{-SW(1-R^2)}{R}}}{1 - R^2 e^{\frac{-SW(1-R^2)}{R}}}$$

and

$$\frac{K}{S} = \frac{(1-R)^2}{2R}$$

one may calculate K and S for the material or mixture of materials of which each sheet is formed. This calculation is time consuming but once the values of K and S have been found for each of the different pulps normally used by a given mill the work need not be repeated until a new pulp must be considered.

Scattering and Absorption Coefficients of Fillers

The determination of K and S for clay, calcium carbonate, or other filler materials is not so readily done. The writer knows of no satisfactory way of forming thin sheets of these materials for measurement of r and W. The most reliable results have been obtained by forming a series of handsheets such as those previously described with filler content ranging from zero to as high a value as is practicable. Plots of K and S for each sheet against the filler content of the sheet enable extrapolation to the values of K and S for a hypothetical sheet containing 100 per cent filler and no pulp.

If the theory relating K_{12} to K_1 and K_2 be correct, the above plot should be linear. Such is usually found to be the case. Curved plots, indicating breakdown of the theory, are found in cases where there is reason to believe that chemical action between filler and pulp may occur. Mixtures of calcium carbonate and groundwood offer a case in point since groundwood darkens at the pH of water suspensions of calcium carbonate.

One may object to the extrapolation to 100 per cent filler content from data ranging only between 0 and 30 per cent or 35 per cent. It must be remembered, however, that in practice one usually interpolates back down to filler contents in the same range so that errors arising from use of the extrapolated values are no worse than the uncertainties in the original data.

Once a set of values of K and S have been determined for the pulps and fillers usually involved in furnish changes, the method of prediction of brightness changes for a given furnish change is obvious. Values of K_{12} and S_{12} are computed for the standard and for the proposed furnish. From these values and the equations:

$$B = 1 + \frac{K}{S},$$

$$R = B - \sqrt{B^2 - 1}$$

one determines the values of R for each furnish. If R_1 represents the brightness of the standard furnish and R_2 that of the proposed furnish, the difference $R_2 - R_1$ will be found to be much more reliable than the estimated values of R, since conditions on the paper machine are not readily matched in making handsheets.

If more than two or three brightness change computations need be made in any given year, it will be advantageous to make use of a book of tables of hyperbolic tangents and cotangents and of the fact that, if:

$$R = \tanh u$$

then

$$B = 1 + \frac{K}{S} = \coth 2u.$$

Thus if we locate the value R as being the hyperbolic tangent of an angle u, the hyperbolic cotangent of the angle $2u$ will be the value of B. The writer has found a copy of "Smithsonian Mathematical Tables, Hyperbolic Functions" invaluable. To save time he has tabulated the values of tanh u in the margin alongside the values of coth $2u$ and thus arrived at a table of R against $1 + (K/S)$. Translation from R to K/S and back again takes but a moment's time using this table.

In Fig. 1 the solid lines give the calculated brightness difference between unfilled papers and papers containing various percentages of filler. The points represent the results obtained from sets of handsheets. The data used in the calculation of brightness differences were taken several years before the handsheets, which yielded the "observed" data, were prepared. Thus while the nominal pulp and filler furnishes involved were identical, new samples of every material were involved.

It will be noted that the calculated and observed curves for TiO_2 (titanium dioxide) do not agree. This is not surprising since the two samples of TiO_2 involved were obtained from different sources and were designed for different uses. It is important to note that large differences in the K values of such a material may occur.

The two clays for which plots are given may be seen to differ widely in brightness producing power. The actual brightness of the two clays did not differ greatly. Despite an appreciable price difference between these clays, the higher priced clay was found to be the most economical for use in certain papers, because its use permitted adoption of a less expensive pulp furnish.

Sources of Error

The development of the theory, on which the foregoing treatment is based, presupposes that the sample in question is of infinite extent and illuminated over

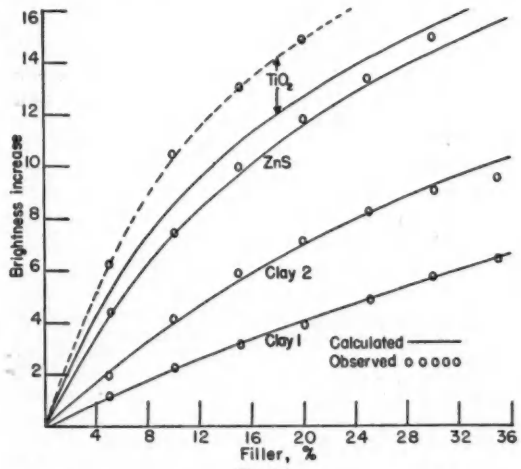


FIG. 1.
Brightness vs. Percentage Filler in Handsheets

its entire surface by diffuse monochromatic light. All light finally returning to the half-space on the irradiated side of the sample is regarded as reflected; all light entering the half-space on the far side of the sample is regarded as transmitted. The absorbed light fraction is the difference between unity and the sum of the reflected and transmitted fractions.

To be strictly applicable, the theory would require that any photometer duplicate the above conditions of geometry and monochromatic nature of the light source. This is, in general, not the case as many photometers approximate the I.C.I. specifications of collimated 45 deg. illumination and normal viewing. The spatial extent of the sample is never infinite. The approximation to monochromatic illumination is very good for most spectrophotometers but is open to suspicion in the case of abridged spectrophotometers and is definitely bad for such photometers as opacimeters designed to measure contrast ratio.

The only answer which one can make to the above objections is that the theory seems to hold reasonably well even for opacity calculations when the same photometer is used in making all observations and the samples considered are limited to "white" papers and "white" papermaking materials. The writer's observations have for the most part been made with the G.E. reflection meter or brightness tester, using the no. 1 filter, and the Bausch and Lomb opacimeter, magnesium oxide being used to determine the reflectance scale.

The quantity $(1—R)$ appears frequently in the equation of the theory of diffuse reflectance. It will be obvious that the presence of this quantity leads to the requirement that the reflectance scale be absolute rather than relative. This is a more severe requirement than has to be met by most other applications of photometric technique since assured constancy of a relative scale is usually entirely satisfactory. In actual practice errors arising from use of a slightly improper reflectance scale become serious only in the case of observations at high values of R or when large differences in the value of R for two comparison computations are involved.

Color Variations in Papermaking

The papermaking process offers many opportunities for color variations to appear. Variations in the color of the pulps and fillers furnished are not negligible. The clarity and volume of the water used may have a large effect and has forced some mills to install filtration plants. In general, on the Fourdrinier machine, there is a tendency for the filler to be more highly concentrated in the upper layers of the paper than in the lower layers, giving rise to reflectance differences sometimes as high as 2 to 3 points in brightness between the two sides of the sheet. Wet pressing, unless carried to extremes, seems to have little effect on brightness but the heat used in drying the paper does, increased severity of drying leading to lowered brightness values.

Machine calendering, unless carried to extremes, appears to have little effect on brightness. Supercalendering invariably lowers brightness, the drop being from 1 to 4 points for various furnishes and degrees of pressure with even higher losses occurring if the sheet is visibly "calender blackened." Calender blackening invariably appears when the sheet is subjected to too high pressures in the supercalender. It is observed as the appearance of an overall graying of the sheet when viewed in reflected light. Close examination reveals the presence of a large number of minute areas of low reflectance. Examination of the sheet by transmitted light discloses the fact that the same areas which appear dark to reflected light are more highly translucent than the surrounding areas. It thus appears that the darkening of the sheet is attributable to a loss of reflecting areas rather than an increase in the percentage of light actually absorbed in any single thickness of the paper.

This loss of reflecting layers must occur by the cementing together of adjacent surfaces of fibers or pigments so that air-fiber or air-pigment interfaces are destroyed. Such a change would be expected to lower the value of S without changing K appreciably. Belief in the correctness of this interpretation is strengthened by the following observations:

(1) Calender blackening becomes increasingly hard to avoid as the moisture content of the paper is increased. Meanwhile the presence of water is an almost essential condition to secure fiber to fiber bonding.

Glassine papers, which are almost transparent and, therefore, almost free from sudden changes in refractive index, are produced by supercalendering paper at very high moisture contents.

(2) Papers containing mineral fillers whose crystals are plate-like, as those of talc or clay, calender blacken much more readily than papers containing crystals of cubic structure such as calcium carbonate.

(3) Papers containing crystals of high refractive index, an example being TiO_2, do not calender blacken readily. In the case of such papers, while air-fiber and air-pigment interfaces can be destroyed and replaced by fiber-fiber, pigment-pigment and fiber-pigment interfaces, the latter interfaces, which are very numerous, still involve large changes in refractive index and hence give rise to large values of S.

The overall loss of brightness attendant upon the normal calendering of paper is always accompanied by a loss of opacity. Both are undoubtedly the result of the destruction of air-fiber and air-pigment interfaces. The phenomenon is much more marked in the supercalendering process, where the paper is pressed between a chilled iron roll and a much softer paper roll than in the machine calendering process where the rolls are both of chilled iron. This is probably due in part to the wiping action resulting from the indentation of the surface of the paper roll by the hard chilled iron roll.

The above sources of brightness and color variation are, in a well controlled mill, not subject to large fluctuations in value during the course of any run. Thus an estimate of the brightness change which may be expected as the result of a given change of furnish on the basis of papers made in the laboratory from similar materials will usually be much more precise than will the estimates of the brightness themselves. It has been the writer's experience over a period of several years that if the result of mill trials fails to check reasonably closely the predicted changes the source of the poor check is almost always found to be somewhere in the control of the mill trials.

Literature Cited

(1) Guerivic: *Physik Zeit.* XXXI, p. 753, (1930).
(2) Kubelka and Munk. *Zeit. fur Techn. Physik,* 12, p. 593 (1931).
(3) T. Smith. *Trans. Opt. Soc.* 33, p. 150, (1931-32).

(To be concluded)

Imports of Paper and Paper Making Stock

Giving Manifests of New York, Boston, Philadelphia and Other Ports of Newsprint, Wrapping, Writing, Coated, Blotting, Tissue, Strawboard, Bleached Sulphite More Acute—Some Grades of Old Waste Lower.

Effective September 30, 1939, under Treasury Decision 49,970, all publications, exchanges and trade associations, were denied access to import manifests at the New York Customs House. The Paper Trade Journal and other interested parties have vigorously protested this ruling, and as soon as the order of the Treasury Department is modified or rescinded, full publication of all manifests will be resumed in these columns. In the interim, the Paper Trade Journal is making every possible effort to gather all available information from manifests, at various outside sources.

NEW YORK IMPORTS

WEEK ENDING SEPTEMBER 28, 1940

SUMMARY

Cigarette paper .....34 cs.
Wall paper .....43 cs.
Newsprint .....669 rolls
Cellophane paper .....6 cs.
Tissue paper .....31 cs.
Miscellaneous paper .....19 cs.

CIGARETTE PAPER

Suarez & Crespo, ——, Bilbao, 3 cs.
——, ——, Bilbao, 31 cs.

WALL PAPER

F. Blank, ——, Lisbon, 40 cs.
W. H. S. Lloyd & Co., ——, Yokohama, 3 cs.

NEWSPRINT

International Paper Co., ——, Gatineau, 287 rolls.
H. G. Craig Co., Inc., ——, Donnacona, 382 rolls.

CELLOPHANE PAPER

Sherwin Bros., ——, Yokohama, 6 cs.

TISSUE PAPER

Corn Exchange Bank Trust Co., ——, Kobe, 10 cs.
National City Bank, ——, Yokohama, 21 cs.

MISCELLANEOUS PAPER

Japan Paper Co., ——, Kobe, 19 cs.

RAGS, BAGGINGS, ETC.

Philadelphia National Bank, ——, Yokohama, 100 bls. fly waste.
Green Textile Associates, ——, Yokohama, 100 bls. cotton waste.
Irving Trust Co., ——, Yokohama, 300 bls. cotton waste.
Manufacturers Trust Co., ——, Yokohama, 150 bls. cotton waste.
W. Intener, ——, Bombay, 200 bls. cotton waste.
Green Textile Associates, ——, Bombay, 132 bls. cotton waste.
Padawaer & Co., ——, Bombay, 100 bls. cotton waste.

GLUE STOCK

Darmstadt Scott & Courtney, ——, Bombay, 583 bags.

PAPER CLOTH

J. Barquin, ——, Kobe, 6 cs.

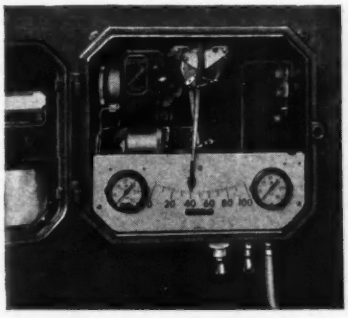
LOS ANGELES IMPORTS

WEEK ENDING SEPTEMBER 28, 1940

——, ——, Tokyo, 1 cs. surface coated paper, 2 cs. hanging paper.
——, ——, Kobe, 5 cs. hanging paper, 4 cs. rice paper.
——, ——, Tientsin, 98 tons rags.
——, ——, Powell River, 235 bls. paper stock, 1,716 pkgs. newsprint.

Taylor Remote Pneumatic Transmission

A simple, accurate and in many instances the only practical and economical means of indicating, recording or controlling process variables remote from the point of measurement is offered by the new Taylor Remote Pneumatic Transmission Systems. This new system of remote transmission is particularly advantageous where it is desirable to correlate temperature, pressure, flow or liquid level data on a centralized panel or in a control room.



Taylor Indicating Transmitter

The system utilizes standard Taylor instruments. It may consist of one or two transmitters connected to a receiver; or one or more receiving instruments, not necessarily near each other, and as far as 1,000 feet from the transmitter. Transmitters or receivers may be indicating, recording or controlling types. Air pressure is the transmitting medium, with ¼ inch O.D. copper tubing as the means of connection.

Taylor Remote Pneumatic Transmission Systems are highly accurate—well within ± 1 per cent of the scale range when properly installed. The speed of response of the receiver to changes in output air pressure from the transmitter is largely dependent upon distance—the maximum lag being 1 second per hundred feet of connecting tubing.

The new Taylor system eliminates the hazards of electrical transmission by doing away with electrical circuits in explosive atmospheres. It measures, transmits and receives continuously regardless of electrical current failures.

For the operator out on the unit, it provides an indicating or recording instrument for observation and eliminates the necessity of returning to the main control board to check the performance of the unit. Interested persons are invited to write to the Taylor Instrument Companies, Rochester, New York, for Bulletin No. 98156 which describes the many advantages of the systems in the measurement and control of pressure, rate of flow and liquid level.

New TAPPI Members

The executive committee of the Technical Association of the Pulp and Paper Industry has elected the following to membership:

Alfredo M. Mastrakalo, studying pulp mill operations at the Puget Sound Pulp and Timber Company, Bellingham, Wash., is a 1939 graduate of the Engineering Institute, Lima, Peru.

Joseph L. McCarthy, research fellow, McGill University, is a 1934 graduate of the University of Washington.

Justin H. McCarthy, plant engineer, Soundview Pulp Company, Everett, Wash., is a graduate civil engineer of Dartmouth College and was formerly with Hardy S. Ferguson, New York, N. Y.

Carl B. McLaughlin, metallurgical division, Carnegie-Illinois Steel Company, Chicago, Ill., is a 1931 graduate of the University of Illinois.

L. Morris Mitchell, vice president, Merritt-Chapman & Scott, New York, N. Y., is a 1914 graduate of the University of Minnesota.

John G. Morrison, chemist, British Columbia Pulp and Paper Company, Port Alice, B. C., is a 1939 graduate of the University of British Columbia.

Theodore J. Nelson, package technician, California and Hawaiian Sugar Refining Corporation, San Francisco, Cal., attended Stanford University.

Edward L. Powell, graduate student, University of North Carolina, is a 1934 graduate of Davidson College and was formerly assistant chemist for the Southern Kraft Corporation, Mobile, Ala.

Alf O. Reims, research assistant, California Institute of Technology, is a 1937 graduate of Abo (Finland) Akademi.

Oscar Stamets, paper mill superintendent, Riegel Paper Corporation, Riegelsville, N. J., was formerly assistant superintendent for the Hamersley Paper Company, Garfield, N. J.

Peter Van Wyck, chief chemist, Virginia Cellulose Company (Hercules Powder Company) Hopewell, Va., is a 1930 graduate (Ph. D.) of Rensselaer Polytechnic Institute.

Arthur K. Warner, chemist, Skinner and Sherman, Boston, Mass., is a 1923 graduate of Lafayette University.

Walter E. Woods, assistant factory manager, A. P. W. Paper Company, Albany, N. Y., is a 1929 graduate of the University of Vermont and was formerly with the Newton Falls Paper Company, the International Paper Company and the Brown Company.

Robert L. Yoder, chemist, Gulf States Paper Corporation, Tuscaloosa, Ala., is a 1937 graduate of the University of Alabama.

TAPPI Notes

The annual meeting of the Technical Association of the Pulp and Paper Industry will be held at the Roosevelt Hotel, New York, N. Y., on February 17-20, 1941. Room reservations should be made at an early date. Individuals desiring to present papers should advise the Secretary, 122 E. 42nd street, New York, as soon as possible.

The Lake States Section will meet at the Conway Hotel, Appleton, Wis., on October 8 at 6:30 P. M. L. D. Staplin will discuss babbitted bearings.

The Delaware Valley Section will meet at the Art Alliance Institute, 251 S. 18th street, Philadelphia, on Friday, October 11 at 7 P. M. Authorities on various phases of lithography will be present to discuss various phases of the exhibition of "Living Lithography" which will be in progress throughout October at the Art Alliance.

The Maine-New Hampshire TAPPI group will meet at the University of Maine, Orono, Me., October 25-26, 1940.

Wilbur L. Orr, formerly chemist for the Port St. Joe Paper Company, is now with Hollingsworth & Whitney Company, Mobile, Ala.

Robert W. Worden, formerly with Dill & Collins, is now with the Armstrong Cork Company, Fulton, N. Y.

James F. Fielding, formerly superintendent, Chillicothe Paper Company, is now residing at 308 W. Prairie street, Vicksburg, Mich.

J. R. Lientz, formerly chemical engineer, Swenson Evaporator Company, is now chief chemist, Union Bag and Paper Company, Savannah, Ga.

James McCalmont, formerly chemist, A. M. Collins Manufacturing Company, is now chemist for the Paterson Parchment Paper Company, Bristol, Ga.

W. K. MacLeod, formerly chemist for the Spruce Falls Power and Paper Company, is now chemist for James MacLaren Company, Buckingham, Que.

L. R. Ayers, formerly student at the New York State College of Forestry is now a student at the Institute of Paper Chemistry, Appleton, Wis.

F. A. Strovink, formerly with Bennett, Inc., is now with the American Cyanamid and Chemical Corporation, Boston, Mass.

J. P. V. Fagan, formerly superintendent, Puget Sound Pulp and Timber Company, is now residing in West Linn, Ore., c/o L. L. Pickens.

S. W. Noble, is now with Hollingsworth & Whitney Company, Mobile, Ala.

Paper Bought Under Walsh-Healey Act

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., October 2, 1940—During the week ended September 14, the Government purchased $179,308.11 worth of paper and allied products under the Walsh-Healey Act as follows: $14,601.22 worth of toilet paper for War Department from J. J. Lipp Papers Company, Chicago, Ill.; $72,832.00[1] worth of bond paper for War Department from R. P. Andrews Paper Company, Washington, D. C.; $20,045.10[1] worth of boxes and separators for D. C. Navy Yard from Crescent Box Corporation, Philadelphia, Pa.; $14,652.00 worth of files, paper from Burrows Filing Company, Inc., N.Y.C., for Navy Department; $26,305.76 worth of paper for Navy Department from the Barton, Duer & Koch Paper Company, Washington, D. C.; and $30,872.03 worth of paper pads for Navy Department from Old Dominion Paper Co., Norfolk, Va.

[1] Indefinite contract other than General Schedule. Purchases to be made if and when needed.

Now Stock in Standardized Sizes

Due to the growing use of short, flat endless belts on short-center and pivoted-motor-base drives, The Manhattan Rubber Manufacturing Division, Passaic, N. J., announces that Condor whipcord endless belts are now available from stock for prompt shipment in a number of sizes and two styles. The two styles which are carried in stock are capable of handling drives from ¼ to 25 hp. and are applicable to more than 1,500 different drives.

"NON-USERS ARE THE LOSERS"

TENAX FELTS

FINISH AND TRIM

AMERICA SHOULDERS THE LOAD!

As available man-power is decreased, our machine-power must be increased. Now is the time to clothe your machines with TENAX FELTS. Assure yourself of many profitable hours of steady production over long periods of operation—we invite you to consult our engineers.

"Non-Users Are The Losers"

LOCKPORT FELT COMPANY
NEWFANE, N. Y.–U. S. A.

APPLETON WIRES are GOOD WIRES

APPLETON WIRE WORKS, INC.
APPLETON, WIS.

New York Paper and Pulp Market Review

Export Trend of Paper Heads Upward On Failure of Germany To Make Delivery To Latin American Countries—Pulp Market Little Changed — Paper Stock Market Strong With Old Kraft Lower.

Office of the PAPER TRADE JOURNAL,
Wednesday, October 2, 1940.

Wholesale paper sales continue to lag behind trade expectations, although general industrial and trade activity is rising, according to reports received from many sources during the current week. As the longer range view of the paper industry is very favorable, the present uptrend as indicated by the indices reflecting general business activity, may be accepted as a reasonably good sign of a moderate improvement in the demand for paper and paper products during the remainder of this year.

Business activity is now nearly equal to the high point of last year and is likely to make a new high record this year. The average volume of business is 4 per cent above last year. Current trade is reported at the highest level in the industrial regions and good in the New York area.

Better business is indicated in the latest reports by the Department of Labor. More than a million non-agricultural workers were employed in August, bringing the total employed to 36,000,000, compared with 36,710,000 for 1929. Industrial production for 1937, according to the Federal Reserve Board index, was 113, compared with 110 for 1929.

Total exports of writing paper for July, 1940, reached a new peak at 7,152 tons, representing 14 per cent of domestic production. Exports declined in August to 4,723 tons, representing 9 per cent of domestic production. After the European conflict began, exports of writing paper increased from month to month, until it reached the peak last July. During the summer, Germany promised to deliver all orders for paper by October 1, 1940, but has been unable to make delivery, which explains in part, at least, why U. S. exports to Latin American countries are now picking up.

Prices on all kinds of paper are fairly firm and hold unchanged with some reports indicating small reductions, through discounts, from prevailing representative quoted market prices. Kraft paper production and shipments are fairly well balanced, with tonnage about equal to 1937, with the current price situation a little soft.

Mechanical Pulp

No important change in the market situation in mechanical pulp has been reported this week. Although this market is considered rather soft in some quarters of the trade, no important change from prevailing market prices on any standard grade of domestic and Canadian mechanical pulp has been reported at this date.

Chemical Pulp

No further weakness in the chemical pulp market is evident this week and demand and prices remain unchanged. The kraft pulp situation continues easy, due to the large capacity in the South.

Rags

Trading in the rag market continues in rather small volume and limited to a few grades. Mill buying is reported for present needs and new cotton cuttings are moving steadily. Roofing mills are also buying on a similar cautious scale and this market is quite strong at this date. Prices hold unchanged on all grades of new and old rags.

Old Rope and Bagging

Old Manila rope continues to reflect the strength shown in the trading last week. With supplies very limited from England and Scotland, and normal requirements of domestic mills in excess of domestic Manila, a very strong market situation must continue so long as demand continues steady and supplies are so limited as at this date.

The bagging market is quite firm this week. Prices continue unchanged at prevailing market quotations.

Old Waste Paper

The old waste paper market continues to be reported as strong, with prices holding unchanged. An exception is old kraft machine compressed bales, which is lower this week and currently quoted at from 1.35 to 1.50.

Twine

No important change in the market situation has been reported this week on any grade of hard or soft fiber twine. Prices hold unchanged.

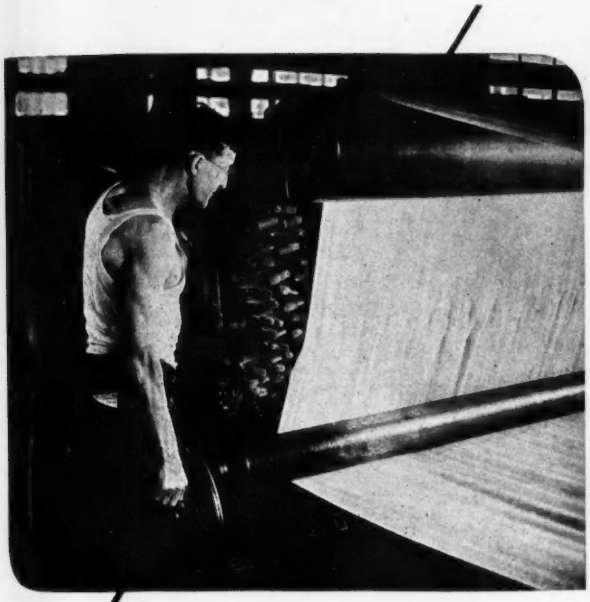
Lake States TAPPI To Meet

The Lake States Section of the Technical Association of the Pulp and Paper Industry will resume its monthly meeting schedule at the Conway Hotel, Appleton, Wisconsin, on Tuesday, October 8, 1940. A dinner served at 6:30 P. M. will be followed by an address by Laurence D. Staplin of the Carbonite Metal Company Ltd. on the subject "The Scientific Side of Babbitted Bearings."

Mr. Staplin began work as a shophand at the age of 17. By the time he was 30 years old he had assembled what was said to be the most complete library on the subject of babbitted bearings. In 1925, on the basis of experiments in deoxydizing babbitt alloys, he established a business. Since then the company has been active in continued research and development of new bearing alloys.

Maintenance men, master mechanics, engineers, and others interested are cordially invited to attend even though they may not be TAPPI members. The practical and technical aspects of paper mill bearing preparation will be discussed.

. . . HERE'S THE WAY ORR PUTS A NAP ON A FELT



Little thistle-like teasels, specially grown for Orr Felt in Oregon, are placed on a revolving drum. Their stiff points dig into the felt as it passes by, raising the wool fibres to form a nap.

This operation is far more difficult than it may appear. For one thing, it requires a trained operator, like this twenty-year veteran, to handle the controls. Then, each different type felt requires a different treatment—depending on the type of nap desired.

The care taken to nap an Orr Felt correctly is typical of the care taken in all Orr Felt departments. The result—felts superior by actual comparison—felts that will show you the true meaning of long life and thorough water removal. Next time, specify Orr Felts.

Orr Felt & Blanket Co.
PIQUA, OHIO

AT LAST!

HERE IS THE
SHEET PACKING
YOU HAVE BEEN WAITING FOR!

SEND
FOR SAMPLE

*Reg. U. S. Pat. Off.

For some time past, a great many users of PALMETTO and other Greene, Tweed Packings have been asking us for a compressed asbestos sheet packing equal in quality and service to PALMETTO. We now take pride in presenting PALMETTO SUPER SHEAT Packing which is available through your mill supply house . . . use it as a general "all-purpose" sheet packing with the assurance of the same long life and efficiency you have obtained from PALMETTO PACKING for over half a century.

GREENE, TWEED & CO.
SELF-LUBRICATING AND SHEET PACKINGS
101 Park Ave., New York, N. Y.
Established 1863

PALMETTO
ASBESTOS SUPER SHEAT PACKING

BE SURE TO SPECIFY PALMETTO SUPER SHEAT AND BE SURE IT'S GREEN

MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL,
Wednesday, October 2, 1940.

BLANC FIXE—Prices on blanc fixe are firm and unchanged and conform to prevailing market levels. The pulp is currently quoted at $35 per ton, in barrels, at works; the powder is currently quoted at $50 per ton, f.o.b., works. Demand reported moderate for the week.

BLEACHING POWDER—Quotations on bleaching powder are firm. Demand reported continuing steady for the week. Bleaching powder is currently quoted at $2 per 100 pounds, in drums, at works.

CASEIN—Prices on casein are firm, with prices unchanged for the current week. Standard domestic casein, 20-30 mesh, is currently quoted at from 11 to 13 cents per pound; 80-100 mesh, at from 11½ to 14 cents per pound. All prices in bags, car lots. Argentina casein, 20-30 mesh, is currently offered at from 11½ to 12½ cents per pound. Quotations on French casein are nominal.

CAUSTIC SODA—Quotations on caustic soda are firm and continue unchanged at prevailing market prices. Shipments reported steady. Solid caustic coda is currently quoted at $2.30 per 100 pounds; flake and ground at $2.70 per 100 pounds, in drums, at works.

CHINA CLAY—Prices on china clay are firm and conform to prevailing market levels. Demand reported moderate at this date. Domestic filler clay is currently quoted at from $7 to $15 per ton; coating clay at from $11 to $22 per ton, at mines. Imported clay is currently offered at from $13 to $25 per ton, ship side.

CHLORINE—Quotations on chlorine are firm and unchanged. Demand reported good during the current week. Chlorine is currently quoted at $1.75 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—The rosin market is reported firm for the week with prices a little higher. "G" gum rosin is currently quoted at from $1.55 to $1.66 per 100 pounds, in barrels, Savannah. "FF" wood rosin is currently quoted at $1.56 per 100 pounds, in barrels, New York.

SALT CAKE—Prices on salt cake are firm and nominal. Demand steady. Domestic salt cake is currently quoted at $17 per ton, in bulk; chrome cake at $16 per ton. All prices in car lots, f.o.b., shipping point. The quotation of $20 per ton on imported salt cake is nominal.

SODA ASH—Quotations on soda ash are firm and continue to conform to prevailing market levels. Demand reported moderately good for the week. Prices on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Prices on corn starch are firm and continue unchanged at prevailing market levels. Pearl is currently quoted at $2.95 per 100 pounds; powdered starch at $3.05 per 100 pounds. All prices in bags, car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—Quotations on sulphate of alumina are firm. Demand continues steady for the current week. The commercial grades are currently quoted at $1.15; iron free at $1.60 per 100 pounds. All prices in bags, car lots, f.o.b., works.

SULPHUR—Prices on sulphur are firm and conform to prevailing market levels. Annual contracts are currently quoted at $16 per long ton, f.o.b., mines. Spot and nearby car lots are quoted at $19 per ton.

TALC—Quotations on talc are firm and continue unchanged at prevailing market prices. Domestic talc is currently quoted at from $15 to $21 per ton, at mines. Quotations on imported talc are nominal.

MARKET QUOTATIONS

Paper

(Delivered New York)

News, per ton—			
Roll, contract	$50.00	@	—
Sheets	58.00	"	—
Kraft—per cwt.—Delivered Zone A			
Northern, Extra Quality	$5.25	@	$5.75
Superstandard	4.87½	"	5.25
Northern Standard Wrapping	4.37½	"	4.62½
Standard Wrapping	4.25	"	—
Tissues—Per Ream—Carlots			
White No. 1	.97½	"	—
White No. 1 M. G.	.95	"	—
White No. 1½	.80	"	—
White No. 2	.75	"	—
Anti-Tarnish M. G.	.80	"	—
Colored	.85	"	—
Kraft	.87½	"	—
Manila	.77½	"	—
Unbl. Toilet, 1 M.	3.75	"	—
Bleached Toilet	5.26	"	—
Paper Towels, Per Case—			
Unbleached, Jr.	2.10	"	—
Bleached, Jr.	3.60	"	—
Manila—per cwt.—C. l. t. a.			
No. 1 Jute	8.25	@	10.25
No. 1 Manila Wrapping, 35 lb.	5.25	"	—
No. 2 Manila Wrapping, 35 lb.	5.00	"	—
Boards, per ton—			
News	35.00	@	40.00
Chip	35.00	"	40.00
Sgl. Mla. Ll. Chip	55.00	"	57.00
White Pat. Coated	67.00	"	70.00
Kraft Liners	55.00	"	—
Binders Boards	73.00	"	80.00

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers	
100% Rag Ext. No. 1	$39.10	@ $46.00	$40.25	@ $47.25
100% Rag	31.05	" 36.50	32.20	" 37.75
85% Rag	....	"	29.90	" 35.00
75% Rag	23.60	" 27.75	24.75	" 29.00
65% Rag	....	"	21.65	" 26.25
50% Rag	17.55	" 21.50	18.70	" 22.75
25% Rag	14.65	" 17.75	15.80	" 19.25

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items, Delivered in Zone 1:

	Bonds		Ledgers	
No. 1	$9.35	@ $11.50	$11.55	@ $12.75
No. 2	8.50	" 10.25	9.65	" 11.75
No. 3	8.05	" 9.25	9.20	" 11.25
No. 4	7.70	" 9.50	8.90	" 10.75

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper, Delivered in Zone 1:

No. 1 Glossy Coated	$11.90	@	$13.50
No. 2 Glossy Coated	10.35	"	11.75
No. 3 Glossy Coated	9.55	"	11.00
No. 4 Glossy Coated	9.15	"	10.50
No. 1 Antique (watermarked)	9.05	"	$10.50
No. 2 Offset	8.40	"	9.75
A Grade E. F.	8.20	"	9.50
A Grade S. & S. C.	8.45	"	9.75
B Grade E. F.	7.65	"	8.75
B Grade S. & S. C.	7.90	"	9.00
C Grade E. F.	7.35	"	8.50
C Grade S. & S. C.	7.60	"	8.75
D Grade E. F.	7.10	"	8.25
D Grade S. & S. C.	7.35	"	8.50

Ivory & India at $.50 cwt. extra.

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—			
Moist	Nominal		
Dry	Nominal		
(Delivered)			
No. 1 Domestic and Canadian	45.00	@	46.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—			
Prime Bleached Sulphite	3.72½	@	3.87½
Prime Qualities—			
Easy-Bleaching Sulphite	3.17½	"	3.75
Strong Unbleached Sulphite	3.17½	"	3.75
(On Dock, Atlantic Ports)			
Kraft Bleached	4.12½	"	
Kraft Light & Strong	3.50	"	3.75
Kraft No. 1	3.40	"	3.60
(F. o. b. Pulp Mill)			
Kraft Domestic and Canadian	2.75	"	3.37½
(Delivered)			
Soda Bleached	3.30	"	—

Add 60 cents per short ton, dock charges for Albany; $2.50 for Lake Ports East and $3.50 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.

Shirt Cuttings—			
New White, No. 1	6.75	@	7.00
Silesias No. 1	4.60	"	4.75
New Unbleached	6.50	"	6.75
Blue Overall	4.35	"	4.50
Fancy	3.25	"	3.50
Washables	2.00	"	2.15
Mixed Khaki Cuttings	2.75	"	3.00
O. D. Khaki Cuttings	3.15	"	3.35

Old Rags

White, No. 1—			
Repacked	3.25	"	3.50
Miscellaneous	2.75	"	3.00
White, No. 2—			
Repacked	2.50	"	2.75
Miscellaneous	2.00	"	2.25
Thirds and Blues—			
Repacked	2.00	"	2.25
Miscellaneous	1.75	"	1.90
Roofing Rags—			
No. 1	.95	"	1.00
No. 2	.80	"	.85
No. 3 (bagging)	.90	"	1.00
No. 4	.60	"	.65
No. 5A	.60	"	.65

Foreign Rags

All prices nominal

New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	"	2.20
New Light Silesias	5.50	"	5.75
Light Flannelettes	5.50	"	5.75
New White Cuttings	7.00	"	7.50
New Light Oxford	4.00	"	4.50
New Light Prints	3.00	"	3.30

Old Rags

No. 1 White Linens	7.50	"	8.00
No. 2 White Linens	6.50	"	7.50
No. 3 White Linens	4.50	"	—

TANKS *TO MEET YOUR SPECIAL REQUIREMENTS*

★ANY SHAPE, ANY SIZE

Propeller Agitator Tank — drawing of Glazed Tile Tank with midfeather arranged for propeller agitation.

Kalamazoo Glazed Tile Tanks are ideal for all types of paper stock chests.

They are stronger, cleaner, more durable, and more economical than any tank made. Built for your individual requirements.

Manufacturers of wood tanks for 60 years.

GLAZED TILE

KALAMAZOO TANK & SILO CO.

KALAMAZOO, MICHIGAN

WOOD

HIGHEST QUALITY CLAYS

LUMP and POWDERED } **IMPORTED**

PAPER MAKERS IMPORTING CO. INC. EASTON, PENNSYLVANIA, U.S.A.

DOMESTIC { CRUDE CRUSHED, AIR FLOATED, WATER WASHED

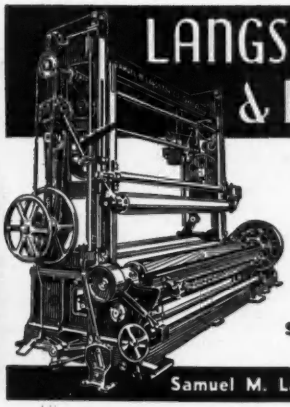
PRECIPITATED CALCIUM CARBONATE

SCREENS of Perforated Metal

The Harrington & King PERFORATING Co.

5632 Fillmore St., Chicago, Ill. 114 Liberty St., New York, N. Y.

LANGSTON SLITTERS & ROLL WINDERS



stand up under heavy service and deliver clean cut rolls of uniform density

SHEAR CUT CLEAN CUT

Samuel M. Langston Company, Camden, N. J.

No. 4 White Linens.	2.25	@	3.25
No. 1 White Cotton.	4.25	"	4.75
No. 2 White Cotton.	3.25	"	3.75
No. 3 White Cotton.	2.50	"	3.00
No. 4 White Cotton.	1.90	"	2.20
Extra Light Prints..	2.00	"	2.40
Ord. Light Prints...	1.75	"	2.15
Med. Light Prints...	1.55	"	1.95
Dutch Blue Cottons.	2.25	"	2.50
French Blue Linens..	3.00	"	—
Checks and Blues...	2.00	"	—
Linsey Garments....	1.90	"	2.00
Dark Cottons.....	1.50	"	1.60
Old Shopperies.....	1.30	"	1.45
New Shopperies.....	1.45	"	1.50
French Blues.....	2.25	"	2.50

Old Rope and Bagging

(Prices to Mill, f. o .b. N. Y.)

Gunny No. 1—			
Foreign	2.75	@	3.00
Domestic	2.50	"	2.75
Wool Tares, light...	2.00	"	2.25
Wool Tares, heavy..	2.12½	"	2.25
Bright Bagging	2.25	"	2.50
Manila Rope—			
Foreign	4.75	"	5.00
Domestic	4.50	"	4.75
Jute Threads.....	2.62½	"	2.75
Sisal Strings.....	2.10	"	2.35
Mixed Strings.....	1.10	"	1.20

Old Waste Papers

(F. o. b. New York)

Shavings—			
White Envelope Cuttings	3.10	@	3.25
Ordinary Hard White No. 1....	2.25	"	2.50
Soft White No. 1..	1.80	"	1.90
Soft White Extra..	2.50	"	2.60
Flat Stock—			
Stitchless	1.10	"	1.25
Overissue Mag.....	.90	"	1.00
Solid Flat Book...	.80	"	.85
Crumbled No. 1...	.70	"	.75
Ledger White Stock.	1.80	"	1.90
Ledger Stock Colored	1.30	"	1.40
Manila—			
New Env. Cut....	1.70	"	1.80
New Cuttings.....	1.30	"	1.40
Old Kraft Machine Compressed bales..	1.35	"	1.50
News—			
No. 1 White News	1.75	"	1.90
Strictly Overissue.	.70	"	.75
Strictly Folded....	.50	"	.55
Corrugated	.65	"	.67½
No. 1 Mixed Paper..	.32½	"	.35

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.19½	@	—
White Hemp.....	.19½	"	—
Fine Polished—			
Fine India.....	.23	"	—
Unpolished—			
Box	.17	"	—
Paper Makers.....	.15¾	"	—
Tube Rope.....	.16¾	"	—
Wall Paper.....	.15½	"	—
Wrapping	.18	"	—
Soft Fiber Rope...	.16¾	"	—
Cotton	.16¾	"	—

(Hard Fiber)

Medium Java.....	.20	"	—
Mex. Sisal.....	.17	"	—
Manila	.24	"	—

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f.o.b. Phila.)

Shirt Cuttings—			
New White No. 1.	.06	@	.06¼
New White No. 2.	.03½	"	.04
Light Silesias.....	—	"	.04½
Silesias, No. 1....	—	"	.04
Black Silesias, soft	—	"	.03
New Unbleached...	.06	"	.06¼
Washable Prints...	.02¾	"	.02½
Washable, No. 1..	—	"	.01¾
Blue Overall.....	.04	"	.04½
Cottons—According to grades—			
Washable shredding	—	"	.01¾
Fancy Percales....	—	"	.03
New Black Soft...	.02½	"	.02¾
New Light Seconds	—	"	.04
New Dark Seconds	—	"	1.50
Khaki Cuttings—			
No. 1 O. D.....	.03½	"	.03¾
No. 2 Mixed.....	.01¾	"	.02
Corduroy	.01¾	"	.01½
New Canvas.....	.04½	"	.05
New Black Mixed.	—	"	.02¾

Domestic Rags (Old)

White No. 1—			
Repacked	3.00	@	3.50
Miscellaneous	2.50	"	2.75
Thirds and Blues—			
Miscellaneous	1.35	"	1.50
Repacked	1.55	"	1.65
Black Stockings (Export)	3.50	"	4.00
Roofing Stock—			
Foreign No. 1....Nominal			
Domestic No. 1...	—	"	.80
Domestic No. 2...	—	"	.80
Roofing Bagging..	—	"	.70

Bagging

(f.o.b. Phila.)

Gunny, No. 1—			
Foreign .....Nominal			
Domestic	2.25	@	2.50
Manila Rope.....	—	"	4.75
Sisal Rope.....	1.75	"	2.00
Mixed Rope.....	.75	"	1.00
Scrap—			
No. 1.....	2.25	"	2.50
No. 2.....	—	"	1.50
Wool Tares, heavy..	3.50	"	3.70
No 1 New Light Burlap	3.00	"	4.00
New Burlap Cuttings	2.00	"	2.25

Old Papers

(f.o.b. Phila.)

Shavings—			
No. 1 Hard White	2.40	@	2.50
No. 2 Hard White	2.10	"	2.15
No. 1 Soft White	2.00	"	2.10
No. 2 Soft White	1.60	"	1.75
No. 1 Mixed.....	.90	"	1.00
Solid Ledger Stock..	1.90	"	2.00
Ledger Stock, white.	1.75	"	1.80
Ledger Stock, colored	1.25	"	1.30
No. 1 Books, heavy..	.80	"	.85
Manila Cuttings.....	1.75	"	1.80
Print Manila.....	.60	"	.65
Container Manila....	.50	"	.55
Kraft Paper.....	1.50	"	1.60
No. 1 Mixed Paper..	.40	"	.45
Straw Board Chip...	.40	"	.45
Binders Board Chip..	.40	"	.45
Corrugated Board...	.65	"	.70
Overissue News.....	.75	"	.80
Old Newspapers.....	.45	"	.50

BOSTON

Old Papers

(f.o.b. Boston)

Shavings—			
No. 1 Hard White	2.75	@	3.00
No. 1 Soft White	2.00	"	2.25
No. 2 Mixed.....	.75	"	.80
Solid Ledger Books..	1.50	"	1.75
Overissue Ledger Stock	1.75	"	2.00
Mixed Ledgers.....	.85	"	.90
No. 1 Heavy Books	1.10	"	1.20
No. 1 Books, light..	.65	"	.75
Crumpled Stitchless Book Stock.....	.55	"	.65
Manila Env. Cuttings	1.85	"	2.00
Manila Envelope Cuttings, extra quality	2.35	"	2.60
White Blank News..	1.40	@	1.50
No. 1 Kraft.....	1.35	@	1.40
Extra No. 1 Kraft...	1.60	"	1.90
Mixed Papers.....	.35	"	.40
Print Manila.....	.50	"	.55
Container Manila...	.60	"	.70
Old Newspapers.....	.50	"	.55
Paper Wool Strings.	.95	"	1.10
Overissue News.....	1.00	"	1.10
Box Board Chips....	.40	"	.45
Corrugated Boxes...	.60	"	.65
Kraft Corrugated Boxes	1.05	"	1.15
New Kraft Corrugated Cuttings....	1.50	"	1.65
Screening Wrappers	.60	"	.70

Bagging

(f.o.b. Boston)

Gunny Bagging—			
Foreign	—	"	2.50
Domestic	2.25	"	2.35
Sisal Rope	2.00	"	2.25
Mixed Rope.....	.85	"	1.00
Transmission Rope—			
Foreign	—	"	2.40
Domestic	2.25	"	2.40
Soft Jute Rope.....	3.00	"	3.25
Manila Rope—			
Foreign	4.75	"	5.00
Domestic	4.75	"	5.00
Jute Carpet Threads.	1.50	"	1.75
Gunny Bagging—			
Foreign	2.75	"	2.85
Domestic	2.25	"	2.50
Bleachery Burlap....	4.00	"	3.25
Scrap Burlap—			
Foreign	2.45	"	2.50
Domestic	2.15	"	2.35
Scrap Sisal.....	2.25	"	2.50
Scrap Sisal for Shredding	2.30	"	2.65
Wool Tares, Domestic	2.40	"	2.50
Wool Tares, Heavy—			
Foreign	2.25	"	2.40
Aust. Wool Pouches.	2.75	"	3.00
New Burlap Cuttings	3.75	"	4.00
Heavy baling bagging	2.25	"	2.40
Paper Mill Bagging..	1.75	"	2.00
No. 2 Bagging.....	.75	"	.80

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints.	—	@	.03
Fancy Percales....	.04	"	.04¼
New White No. 1.	.07½	"	.07¾
New Light Flannelettes	.05	"	.05¼
Canton Flannel, Bleached	.07	"	—
Silesias No. 1	.05	"	—
New Black Silesias..	3.00	"	3.25
Red Cotton Cuttings	.04	"	.05
Soft Unbleached...	.07	"	.07½
Blue Cheviots.....	.05	"	.05½
Fancy	.02	"	.02½
Washable	.02	"	.02½
Cottons—According to Grades—			
Blue Overalls.....	.04¾	"	.05
New Black, Soft..	.03	"	.03¼
Khaki Cuttings.....	.03	"	—
O. D. Khaki.....	.03	"	.03½
Corduroy	.02¼	"	.03
New Canvas.....	.06¼	"	.07¼
B. V. D. Cuttings...	.07	"	.07½

Domestic Rags (Old)

(F. o.b. Boston)

White No. 1—			
Repacked	2.75	"	3.75
Miscellaneous	2.40	"	2.60
White No. 2—			
Repacked	1.90	"	2.00
Miscellaneous	2.00	"	2.25
Twos and Blues.....	1.50	"	2.00
Old Blue Overalls ..	1.60	"	2.00
Thirds and Blues—			
Repacked	—	"	1.25
Miscellaneous	—	"	1.00
Black Stockings.....	3.50	"	4.00
Roofing Stock—			
No. 1.....	1.00	"	1.25
No. 2.....	—	"	1.10
No. 3.....	—	"	.90

Foreign Rags

(F. o. b. Boston)

Canvas	.04¼	@	—
Dark Cottons.....	(nominal)		
Dutch Blues.....	(nominal)		
New Checks and Blues	(nominal)		
Old Fustians.....	(nominal)		
Old Linsey Garments.	(nominal)		
New Silesias.....	(nominal)		

CHICAGO

Waste Paper

(f.o.b. Chicago)

Shavings—			
No. 1 White Envelope cuttings....	3.15	@	—
No. 1 Hard White	2.50	"	2.65
No. 1 Soft White.	2.00	"	2.20
Ledger and Writings	.85	"	.95
Solid Books.....	.95	"	1.10
Blanks	1.50	"	1.60
Krafts	1.40	"	1.50
New Kraft Cuts.....	1.60	"	1.75
Overissue News.....	1.00	"	1.10
Old Newspapers—			
No. 1 Folded News	.70	"	.80
No. 1 Mixed Paper	.40	"	.50
Roofing Stocks—			
No. 1.....	.95	@	1.00
No. 2.....	.85	"	.90

Brown Co. Launches Ad Campaign

The first week in October will see the start of the fall advertising campaign for Nibroc aqualized towels. This will be a continuation of the 1940 program which began last December, and will be the most intesive consumer advertising campaign ever conducted by Brown Company for its towel line. *Life, Business Week,* and *Time* will carry this advertising which will be directed at all buyers of industrial paper towels.

Theme for the fall campaign will be the aqualized feature of Nibroc towels.

The Brown Company has always been a leader in the paper towel industry, both in size of output and in product development. The company's early kraft towel was the first really strong paper towel ever made. Aqualized towel sales during the past three years, have shown tremendous increases each year. The current year, to date, is by far the largest in the company's history, and the final four months are expected to exceed even last year's record sales for this period.

The company's distributors attribute their sales increases, in large part, to the aqualized feature which is exclusive with Brown Company towels, and the vigorous advertising in which this feature has been promoted to towel buyers.

The Brown Company is fortunate in having vast northern spruce timberlands which supply the pulp requirements for aqualized towels. The pulps used are Brown Company's own white husky cellate and Northern spruce sulphate. The company sells entirely through distributors and early this year inaugurated a quarterly wholesale price policy that has been most valuable.